TO STUDY CLINICAL AND NEURO-ELECTROPHYSIOLOGICAL PARAMETERS IN PATIENTS WITH TYPE 2 DIABETES

A THESIS SUBMITTED TO BABA FARID UNIVERSITY OF

HEALTH SCIENCES, FARIDKOT (PUNJAB)

IN THE PARTIAL FULFILLMENT

FOR THE AWARD OF DEGREE OF

DM

IN

NEUROLOGY

MAY, 2023

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Dedicated

to

my Family

&

Teachers

ACKNOWLEDGEMENT

I would like to express my sincere gratitude to the following individuals who have made this thesis possible and provided me with invaluable support and guidance throughout my journey. First and foremost, I would like to extend my sincerest thanks to my thesis advisor, **Dr. Rajinder K. Bansal**, Professor, Department of Neurology, DMCH, Ludhiana, for his unwavering support, encouragement, and mentorship. I would like to thank **Dr. Birinder Singh Paul,** Professor, Department of Neurology, DMCH, Ludhiana for his guidance, expertise, and insights which have been instrumental in shaping my research. I would also like to extend my gratitude to **Dr. Parminder Singh**, Former Professor and Head, Department of Endocrinology, DMC&H, Ludhiana for his contributions which have been essential in the structuring of the thesis plan and for the successful completion of thesis. I owe my gratitude to **Dr. Gagandeep Singh**, Professor and Head, Department of Neurology, DMC&H, Ludhiana for his invaluable advice and support.

Words are woefully inadequate to express my sense of gratitude to my father **Dr. Rajendra Gupta** and my mother **Dr. Rita Gupta**, for their unconditional love and support that helped me sail through all hard times. I would like thank my wife **Ruchika Sharma** for helping me survive all the stress and not letting me give up. I feel blessed to have my younger brother **Dr. Nayan Gupta** for continuous support, help and encouragement in all walks of life.

Dr. Rajat Gupta

LIST OF ABBREVIATIONS

2hPG	2-hour Post-load plasma Glucose
ABI	Ankle-Brachial Index
ADA	American Diabetes Association
AFIRM	Armed Forces Institute of Rehabilitation Medicine
AUROC	Area under Research Operating Characteristic Curve
BSF	Blood Sugar Fasting
BSR	Random Blood Sugar
CI	Confidence Interval
CIDP	Chronic Inflammatory Demyelinating Polyneuropathy
CMAP	Compound Muscle Action Potential
CSME	Clinically Significant Macular Edema
CV	Cardiovascular
DM	Diabetes Mellitus
DMCH	Dayanand Medical College & Hospital
DN	Diabetic Neuropathy
DN4	Douleur Neuropathique 4
DPNP	Diabetic Peripheral Neuropathic Pain
DPN	Diabetic Peripheral Neuropathy
DR	Diabetic Retinopathy
DSPN	Distal Symmetric Polyneuropathy
DSN	Distal Sensory Neuropathy
EMG/EP	Electromyography/ Electrophysiology
ETDRS	Early Treatment of Diabetic Retinopathy Study
HbA1c	Glycosylated hemoglobin
IDDM	Insulin Dependent Diabetes Mellitus
IGT	Impaired Glucose Tolerance
JPS	Joint Position Sense
MCV	Motor Conduction Velocity
MDNS	Michigan Diabetic Neuropathy Score

MNSI	Michigan Neuropathy Screening Instrument
mMNSI	modified Michigan Neuropathy Screening Instrument
NAP	Nerve Action Potential
NCS	Nerve Conduction Study
NCV	Nerve Conduction Velocity
N.D.	Normative data
NDS	Neuropathy Disability Score
NIDDM	Non-Insulin Dependent Diabetes Mellitus
NPDR	Non Proliferative Diabetic Retinopathy
NR	Non-recordable
NSS	Neuropathy Symptom Score
OPD	Out Patient Department
OR	Odds Ratio
PAD	Peripheral Arterial Disease
PDR	Proliferative Diabetic Retinopathy
PN	Peripheral Neuropathy
ROC	Receiver operating characteristic
SBP	Systolic Blood Pressure
SCV	Sensory Conduction Velocity
SD	Standard Deviation
SFN	Small Fibre Neuropathy
SNAP	Sensory Nerve Action Potential
SNCV	Sensory Nerve Conduction Velocity
SSR	Sympathetic Skin Response
T2DM	Type 2 Diabetes Mellitus
UACR	Urine Albumin Creatinine Ratio
UKST	United Kingdom Screening Test
VPT	Vibration Perception Threshold
WPN	Whole Plantar Nerve

ABSTRACT

Introduction: Nerve conduction studies (NCS), Vibration perception threshold (VPT), Sympathetic skin response (SSR) and Ankle-brachial index (ABI) are commonly used to assess patients with Type 2 Diabetes Mellitus (T2DM). However, the correlation of these parameters with clinical variables such as HbA1c, duration of diabetes, diabetic nephropathy, retinopathy has not been extensively explored.

Aims and Objective: This study aimed to investigate the clinical and neuro-electrophysiological parameters in patients with T2DM and to assess the associations between them.

Material and Methods: This observational, non-blinded, cross-sectional study enrolled patients aged over 40 years with a diabetes duration exceeding one year. Clinical assessment was done using the Michigan Neuropathy Screening Instrument (MNSI). Fasting blood glucose, HbA1c, and urine albumin-creatinine ratio (UACR) were measured. NCS abnormalities were diagnosed based on the Toronto Diabetic Neuropathy Expert Group criteria. VPT, SSR, and ABI measurements were obtained for all participants.

Results: The study included 125 patients, with a mean age of 61 years and a female proportion of 31.2%. The mean duration of diabetes was 9.28 years, mean fasting blood glucose was 161 mg/dl, and mean HbA1c was 8.98%. Axonal sensorimotor polyneuropathy was the most prevalent type of neuropathy. NCS abnormalities were present in 83.2% of the participants and were significantly correlated with age, gender, duration of diabetes, HbA1c levels, nephropathy, retinopathy, MNSI scores, VPT, and SSR. The Medial/Lateral plantar motor and Sural sensory nerves were found to be the earliest nerves affected in Diabetic peripheral neuropathy (DPN). Abnormal VPT was observed in 91.2% of the participants, abnormal SSR in 89.6%, and abnormal ABI in 24%.

Conclusion: DPN is highly prevalent in patients with T2DM, and its severity is significantly associated with microvascular complications. A combination of NCS parameters can effectively detect early DPN. VPT is a sensitive screening tool, SSR identifies autonomic dysfunction, and ABI detects vasculopathy in DPN patients.

Key words: Type 2 Diabetes Mellitus, microvascular complications, Nerve conduction studies (NCS), Vibration perception threshold (VPT), Sympathetic skin response (SSR), Ankle-brachial index (ABI), Michigan Neuropathy Screening Instrument (MNSI) and Toronto Diabetic Neuropathy Expert Group criteria.

TABLE OF CONTENTS

S.NO.	TOPIC	PAGES
I	INTRODUCTION	1-5
II	AIMS AND OBJECTIVES	6
III	REVIEW OF LITERATURE	7-28
IV	MATERIALS AND METHODS	29-34
V	OBSERVATIONS AND RESULTS	35-114
VI	DISCUSSION	115-126
VII	SUMMARY AND CONCLUSIONS	127-131
VIII	BIBLIOGRAPHY	132-137

APPENDICES–I

- PROFORMA
- MASTER CHART

APPENDICES–II

- APPROVAL LETTER OF THESIS PLAN
- THESIS PLAN

LIST OF TABLES

TABLE NO.	TITLE	PAGE NO.
1.	Demographic and biochemical data of study population	35
2.	Distribution of study population based on age of study participants	36
3.	Distribution of study population based on gender of study participants	37
4.	Distribution of study population based on duration of diabetes of study participants	38
5.	Distribution of study population based on Fasting blood glucose (mg/dl) of study participants	39
6.	Distribution of study population based on HbA1c (%) of study participants	40
7.	Distribution of study population based on UACR of study participants	41
8.	Distribution of study population based on Fundoscopy findings of study participants	42
9.	Distribution of study population based on MNSI-A score of study participants	43
10.	Distribution of study population based on MNSI-B score of study participants	44
11.	Distribution of study population based on Vibration perception threshold (VPT) of study participants	45
12.	Distribution of study population based on Ankle Brachial Index (ABI) of study participants	46
13.	Distribution of study population based on Sympathetic skin response (SSR) of study participants	47
14.	Distribution of study population based on Nerve conduction study (NCS) of study participants	48
15.	Distribution of study population based on classification of DPN	49
16.	Distribution of study population based on Stage of severity of DSPN.	50

17.	Distribution of study population based on Impression of Nerve conduction study	51
18.	Distribution of study population based on abnormal Median motor nerve conduction study parameters	52
19.	Distribution of study population based on abnormal Ulnar motor nerve conduction study parameters	54
20.	Distribution of study population based on abnormal Peroneal motor nerve conduction study parameters	55
21.	Distribution of study population based on abnormal Tibial motor nerve conduction study parameters	56
22.	Distribution of study population based on abnormal Femoral motor nerve conduction study parameters	57
23.	Distribution of study population based on abnormal Medial plantar motor nerve conduction study parameters	58
24.	Distribution of study population based on abnormal Lateral plantar motor nerve conduction study parameters	59
25.	Distribution of study population based on abnormal Median sensory nerve conduction study parameters	60
26.	Distribution of study population based on abnormal Ulnar sensory nerve conduction study parameters	61
27.	Distribution of study population based on abnormal Saphenous sensory nerve conduction study parameters	62
28	Distribution of study population based on abnormal Sural sensory nerve conduction study parameters	63
29.	Distribution of study population based on abnormal Supeficial peroneal sensory nerve conduction study parameters	64
30	Distribution of study population based on abnormal Medial planter sensory nerve conduction study parameters	65

31.	Distribution of study population based on abnormal Lateral planter sensory nerve conduction study parameters	66
32.	Distribution of study population based on abnormal Median F-wave nerve conduction study parameters	67
33.	Distribution of study population based on abnormal Ulnar F-wave nerve conduction study parameters	68
34.	Distribution of study population based on abnormal Peroneal F-wave nerve conduction study parameters	69
35.	Distribution of study population based on abnormal Tibial F-wave nerve conduction study parameters	70
36.	Correlation of age group of study participants with clinical and neuro-electrophysiological parameters	71
37.	Correlation of Gender of study participants with other clinical and neuro-electrophysiological parameters	73
38.	Correlation of Duration of diabetes group of study participants with other clinical and neuro-electrophysiological parameters	75
39.	Correlation of MNSI-A score with Fasting blood glucose and HbA1c levels	77
40.	Correlation of MNSI-B score with Fasting blood glucose and HbA1c levels	77
41.	Correlation of Nerve conduction study (NCS) with Fasting blood glucose and HbA1c levels	78
42.	Correlation of Classification of DPN with Fasting blood glucose and HbA1c levels	78
43.	Correlation of Stage of severity of DSPN with Fasting blood glucose and HbA1c levels	79
44.	Correlation of Ankle Brachial Index (ABI) with Fasting blood glucose and HbA1c levels	79
45.	Correlation of Vibration perception threshold (VPT) with Fasting blood glucose and HbA1c levels	80
46.	Correlation of Sympathetic skin response (SSR) with Fasting blood glucose and HbA1c levels	80

47.	Correlation of UACR with other clinical and neuro-electrophysiological parameters	81
48.	Correlation of Fundoscopy findings of study participants with other clinical and neuro-electrophysiological parameters	83
49.	Correlation of MNSI-A score of study participants with neuro-electrophysiological parameters	85
50.	Correlation of MNSI-B score of study participants with neuro-electrophysiological parameters	86
51.	Correlation of Nerve conduction study (NCS) of study participants with other neuro-electrophysiological parameters	87
52.	Correlation between Duration of diabetes (years) group and Individual NCS parameters	88
53.	Correlation of HbA1c (%) group and Individual NCS parameters	92
54	Correlation of Fasting blood glucose (mg/dl) group with Sural sensory latency and amplitude	96
55	Correlation of Ankle Brachial Index (ABI) with Sural sensory latency and amplitude	96
56	Correlation of NCS with clinical and neuro-electrophysiological parameters	97
57	Correlation of Classification of DPN with clinical and neuro-electrophysiological parameters	99
58	Correlation of Stage of severity of DSPN with clinical and neuro-electrophysiological parameters	101
59	Correlation of NCS with individual NCS parameters	103
60	Correlation of Classification of DPN with individual NCS parameters	107
61.	Correlation of Stage of severity of DSPN with individual NCS parameters	111

LIST OF FIGURES

FIGURE NO.	TITLE	PAGE NO.
1	Percentage wise distribution of age group of study population.	36
2	Percentage wise distribution of gender of study population	37
3	Percentage wise distribution of duration of diabetes of study population	38
4	Percentage wise distribution of study population based on Fasting blood glucose (mg/dl)	39
5	Percentage wise distribution of HbA1c (%) of study participants	40
6	Percentage wise distribution of UACR of study population	41
7	Percentage wise distribution of Fundoscopy findings of study population	42
8	Percentage wise distribution of study population based on MNSI-A score	43
9	Percentage wise distribution of study population based on MNSI-B score	44
10	Percentage wise distribution of study population based on Vibration perception threshold (VPT)	45
11	Percentage wise distribution of study population based on Ankle Brachial Index (ABI)	46
12	Percentage wise distribution of study population based on Sympathetic skin response (SSR)	47
13	Percentage wise distribution of study population based on Nerve conduction study (NCS)	48

14	Percentage wise distribution of study population based on classification of Diabetic peripheral neuropathy (DPN)	49
15	Percentage wise distribution of study population based on Stage of severity of DSPN	50
16	Percentage wise distribution of study population based on Impression of Nerve conduction study	52
17	Percentage wise distribution of study population based on abnormal Median motor nerve conduction study parameters	53
18	Percentage wise distribution of study population based on abnormal Ulnar motor nerve conduction study parameters	54
19	Percentage wise distribution of study population based on abnormal Peroneal motor nerve conduction study parameters	55
20	Percentage wise distribution of study population based on abnormal Tibial motor nerve conduction study parameters	56
21	Percentage wise distribution of study population based on abnormal Femoral motor nerve conduction study parameters	57
22	Percentage wise distribution of study population based on abnormal Medial plantar motor nerve conduction study parameters	58
23	Percentage wise distribution of study population based on abnormal Lateral plantar motor nerve conduction study parameters	59
24	Percentage wise distribution of study population based on abnormal Median sensory nerve conduction study parameters	60

25	Percentage wise distribution of study population based on abnormal Ulnar sensory nerve conduction study parameters	61
26	Percentage wise distribution of study population based on abnormal Saphenous sensory nerve conduction study parameters	62
27	Percentage wise distribution of study population based on abnormal Sural sensory nerve conduction study parameters	63
28	Percentage wise distribution of study population based on abnormal Superficial peroneal sensory nerve conduction study parameters	64
29	Percentage wise distribution of study population based on abnormal Medial planter sensory nerve conduction study parameters	65
30	Percentage wise distribution of study population based on abnormal Lateral planter sensory nerve conduction study parameters	66
31	Percentage wise distribution of study population based on abnormal Median F-wave nerve conduction study parameters	67
32	Percentage wise distribution of study population based on abnormal Ulnar F-wave nerve conduction study parameters	68
33	Percentage wise distribution of study population based on abnormal Peroneal F-wave nerve conduction study parameters	69
34	Percentage wise distribution of study population based on abnormal Tibial F-wave nerve conduction study parameters	70

INTRODUCTION

Type 2 diabetes is due to a non-autoimmune progressive loss of adequate b-cell insulin secretion frequently on the background of insulin resistance and metabolic syndrome.[1] An estimated 537 million adults aged 20–79 years worldwide (10.5% of all adults in this age group) have diabetes.[2] The prevalence of diabetes in India has risen from 7.1% in 2009 to 8.9% in 2019. Currently, 25.2 million adults are estimated to have IGT, which is estimated to increase to 35.7 million in the year 2045. India ranks second after China in the global diabetes epidemic with 77 million people with diabetes. Of these, 12.1 million are aged >65 years, which is estimated to increase to 27.5 million in the year 2045. It is also estimated that nearly 57% of adults with diabetes are undiagnosed in India, which is approximately 43.9 million. The mean healthcare expenditure on diabetes per person is 92 US dollars, and total deaths attributable directly to diabetes account for 1 million. The report on the state-level disease burden in India stated that the percent change in diabetes prevalence among all ages in India from 1990 to 2016 was 64.3%, while the age-standardized prevalence was 29.3%. The India State-Level Disease Burden Initiative Diabetes study collaborators reported that the prevalence and number of people with diabetes in India increased from 5.5% and 26.0 million in 1990 to 7.7% and 65.0 million in the year 2016. According to this report, Tamil Nadu had the highest prevalence in 2016, followed by Kerala, Delhi, Punjab, Goa, and Karnataka.[3]

The neuropathies developing in patients with diabetes are known to be heterogeneous by their symptoms, pattern of neurologic involvement, course, risk covariates, pathologic alterations, and underlying mechanisms. The typical Diabetic Peripheral Neuropathy (DPN) is a chronic, symmetrical, length-dependent Distal Symmetric Polyneuropathy (DSPN) and is thought to be the most common variety. It develops on (or with) a background of long-standing hyperglycaemia, associated metabolic derangements (increased polyol flux, accumulation of advanced glycation end products, oxidative stress, and

lipid alterations among other metabolic abnormalities), and cardiovascular risk factors. Alterations of microvessels, similar to those observed in diabetic retinopathy and nephropathy, appear to be associated with the pathologic alterations of nerves. Total hyperglycemic exposure is perhaps the most important risk covariate. This variety is stabilized, perhaps even improved, by rigorous glycemic control. This polyneuropathy is statistically associated with retinopathy and nephropathy. Autonomic dysfunction and neuropathic pain may develop over time.[4]

The atypical DPNs are different from DSPN in several important features, i.e., onset, course, manifestations, associations, and perhaps putative mechanisms. They appear to be intercurrent varieties, developing at any time during the course of a patient's diabetes. Onset of symptoms may be acute, subacute, or chronic, but the course is usually monophasic or fluctuating over time. Pain and autonomic symptoms are typical features and altered immunity has been suggested.[4]

The Michigan Neuropathy Screening Instrument (MNSI) is used widely for the evaluation of DSPN in diabetes. The MNSI includes two separate assessments, a 15-item self-administered questionnaire that is scored by summing abnormal responses, and a lower extremity examination that includes inspection and assessment of vibratory sensation and ankle reflexes and is scored by assigning points for abnormal findings.[5]

DSPN is a symmetrical, length-dependent sensorimotor polyneuropathy attributable to metabolic and microvessel alterations as a result of chronic hyperglycemia exposure (diabetes) and cardiovascular risk covariates. An abnormality of nerve conduction tests, which is frequently subclinical, appears to be the first objective quantitative indication of the condition. The occurrences of diabetic retinopathy and nephropathy in a given patient strengthen the case that polyneuropathy is attributable to diabetes. Other causes of sensorimotor polyneuropathy need to be excluded. For epidemiologic

surveys or controlled clinical trials of DSPN, nerve conduction testing is an early and reliable indicator of the occurrence of this neuropathy.[4]

Nerve conduction studies (NCSs) are an essential tool in the evaluation of the peripheral nervous system. The sensory nerve action potential (SNAP) provides information on the sensory nerve axon and its pathway from the distal receptors in the skin to the dorsal root ganglia, while the compound muscle action potential (CMAP) is an assessment of the motor nerve fibers from their origins in the anterior horn cell to their termination along muscle fibers. Various parameters of the SNAP and CMAP waveforms are used to determine the number of functioning nerve fibers and the speed of conduction. Similarly, specific electrodiagnostic patterns involving SNAP and CMAP amplitudes, latencies, and other measurements can help discern the underlying nerve pathophysiology as either axon loss or demyelinating in nature.[6]

The NCS can be used to objectively confirm the presence of a lesion, characterize the underlying pathophysiology, and determine the degree of severity. They can also help with lesion localization and prognostication. Nerve conduction studies (NCS) are considered to be the most sensitive, reliable, non-invasive, and objective means of investigating diabetic neuropathy.[7]

Not all patients present typical features of neuropathy, i.e., paraesthesias and weakness in the upper and lower limbs. Up to 75% of such neurologically asymptomatic patients may have nerve conduction abnormalities that are typical of neuropathy. The transition from subclinical to clinical neuropathy in patients with diabetes mellitus has not been described, and despite being a gold standard for the diagnosis of all neuropathies, the value of NCS in detecting and predicting subclinical diabetic neuropathy is not well established.[8]

In addition, NCSs do not evaluate unmyelinated nerve fibres. Thus they are not the ideal modality for studying pain or autonomic dysfunction, which are mediated through thinly myelinated A-delta and unmyelinated C fibers. For patients presenting with these symptoms, specialized small nerve fibre testing may be considered.[6]

Sympathetic skin response (SSR) represents a potential generated in skin sweat glands; it originates from the activation of the reflex arch with different kinds of stimuli. The potential of rapid habituation after repeated stimuli are formed by biphasic or triphasic slow wave activity with relatively stable latency and variable amplitude. SSR is age dependent and is present in both hands and feet till the age of 60 years, but after the age of 60 years, it is recorded in hands in 75% and feet in 50% of cases. SSR is most frequently used in diagnosing the functional impairment of non-myelinated postganglionic sudomotor sympathetic fibres in peripheral neuropathies.[9]

The Vibration Perception Threshold (VPT) plays a pivotal role in the early detection of DPN and subsequently, it reduces the risk of foot ulceration. In VPT, the electric current mode is converted into vibration mode and transverse to the patient. VPT measures large nerve fibre integrity and perception is normally poorer in the lower extremity than in the upper extremity.[10]

Ankle-brachial index (ABI) is a simple method to screen peripheral arterial disease (PAD) and to evaluate cardiovascular (CV) prognosis in the general population. The ankle-brachial index (ABI) is the ratio of the systolic blood pressure measured at the ankle to that measured at the brachial artery. Measuring it requires a hand-held Doppler probe but it can be done also with an automatic device. ABI is an effective tool for clinical practice or clinical studies.[11]

Although nerve conduction studies are considered the gold standard for the diagnosis of diabetic neuropathy, the prevalence of different patterns of nerve conduction abnormalities in patients with diabetic neuropathy is not well described. Although NCS form the basis for the diagnosis of DSP, they are complex, time-consuming, and require referral to specialized testing centres. The use of simple components of NCS and the analysis of normal and abnormal threshold values specific to patients with diabetes could improve its applicability.

The correlation of nerve conduction parameters with age, gender, duration of diabetes, degree of glycemic control, clinical signs and symptoms assessed by MNSI score, degree of nephropathy, and

retinopathy is not well established. The correlation of NCS with SSR, VPT, and ABI has not been studied in a single study.

The prevailing view of the pathophysiology is that axonal degeneration and progressive loss of nerve fibres are paramount.[12] These axonal changes are identified by reduced motor and sensory action potential amplitudes, with normal or slightly reduced conduction velocities secondary to the loss of the largest and fastest conducting axons.[13] However, diverse pathophysiologies may be factors in DSP. For example, some studies have demonstrated slowing of nerve conduction velocity out of proportion to axonal loss in DSP demonstrating evidence of demyelination.[14,15] Given the potential for diabetic patients to have a spectrum of pathophysiologies from a classical axonopathy, to evidence of minor or mild demyelinating findings, to evidence of a primary demyelinating disease as seen in CIDP it is important to distinguish between them because differentiation may lead to effective targeted therapies.

AIMS AND OBJECTIVES OF THE STUDY

AIM

To study clinical and neuro-electrophysiological parameters in patients with Type 2 Diabetes.

OBJECTIVE

To study clinical and neuro-electrophysiological parameters in patients of Type 2 Diabetes and to study association between them.

REVIEW OF LITERATURE

Diabetes, a major lifestyle disorder, has become a global burden, and the prevalence rates are rising steeply in developing economies. Rapid socioeconomic transition with urbanization and industrialization are the main causes of the global diabetes epidemic. Among developing economies, the highest increase in the number of people with diabetes is in China followed by India. In India, the epidemic of diabetes continues to increase and is experiencing a shift in diabetes prevalence from urban to rural areas, from the affluent to the less privileged, and from older to younger people. Diabetes is a progressive disorder leading to complications, which are broadly divided into small vessel or microvascular disease and large vessel or macrovascular disease. The macrovascular complications affect the heart, the brain, and the peripheral arteries termed cardiovascular disease, cerebrovascular disease, and peripheral vascular disease, respectively. Microvascular complications affect the inner part of the eye—the retina known as diabetic retinopathy, the kidney termed diabetic nephropathy, and the peripheral nerves termed diabetic neuropathy.[16]

What is Diabetic neuropathy?

Bansal V et al (2006) defined that Diabetic neuropathy (DN) refers to symptoms and signs of neuropathy in a patient with diabetes in whom other causes of neuropathy have been excluded. Distal symmetrical neuropathy is the commonest accounting for 75% DN. Asymmetrical neuropathies may involve cranial nerves, thoracic or limb nerves; are of acute onset resulting from ischemic infarction of vasa nervosa. Asymmetric neuropathies in diabetic patients should be investigated for entrapment neuropathy. Diabetic amyotrophy, initially considered to result from metabolic changes and later ischemia, is now attributed to immunological changes. For diagnosis of DN, symptoms, signs, quantitative sensory testing, nerve conduction study, and autonomic testing are used; and two of these five are recommended for clinical diagnosis. Management of DN includes control of hyperglycemia, other cardiovascular risk factors; α lipoic acid, and L carnitine. For

neuropathic pain, analgesics, non-steroidal anti-inflammatory drugs, antidepressants, and anticonvulsants are recommended. The treatment of autonomic neuropathy is symptomatic.[17]

Michigan Neuropathy Screening Instrument (MNSI)

E L Feldman et al (1994) gave a practical two-step quantitative clinical and electrophysiological assessment for the diagnosis and staging of diabetic neuropathy. Patients were initially administered a brief questionnaire and screening examination, designated the Michigan Neuropathy Screening Instrument (MNSI). Diabetic neuropathy was confirmed in patients with a positive assessment by a quantitative neurological examination coupled with nerve conduction studies, designated the Michigan Diabetic Neuropathy Score (MDNS). In this study, 56 outpatients with confirmed type I or II diabetes were administered the standardized quantitative components required to diagnose and stage diabetic neuropathy according to the San Antonio Consensus Statement and the Mayo Clinic protocol. These same patients were then assessed with the MNSI and the MDNS. Results: Of 29 patients with a clinical MNSI score > 2, 28 had neuropathy. Twenty-eight patients with an MDNS of > or = 7 had neuropathy, while 21 non-neuropathic patients had a score < or = 6. Of 35 patients with diabetic neuropathy, 34 had > or = 2 abnormal nerve conductions. Twenty-one normal patients and one patient with neuropathy had < or = 1 abnormal nerve conduction. They concluded that the results indicate that the MNSI is a good screening tool for diabetic neuropathy and that the MDNS coupled with nerve conductions provides a simple means to confirm this diagnosis.[5]

Ali Moghtaderi et al (2006) conducted a study to determine the diagnostic performance of the test characteristics and cut-off point of the Michigan neuropathy screening instrument (MNSI) scoring for the diagnosis of diabetic peripheral neuropathy. Method: Over 2 years, a cross-sectional study was conducted on 176 type 2 diabetic patients. An internist carried out the MNSI and the sum of scores varying from 0 to 1 for each abnormality as revealed in foot appearance, ulceration, ankle reflexes, and vibratory perception was

recorded. A neurologist, who was blind to the MNSI scores, performed all neurophysiologic studies. The test performance characteristics of the MNSI procedure were measured for different cut-off values. Results: MNSI scores of 1.5, 2.0, 2.5, and 3.0 were assessed as cut-off values. Sensitivities were 79%, 65%, 50%, and 35% and specificities were 65%, 83%, 91%, and 94%, respectively. Positive predictive values increased and negative predictive values decreased for each score. Accuracies, likelihood ratios, and post-test probabilities were measured. They concluded that the accuracy of MNSI scoring makes it a useful screening test for diabetic neuropathy in deciding which patients should be referred to a neurologist for electrophysiological studies. High specificity, likelihood ratios over 5, and a moderate to good post-test probability give a high diagnostic impact for MNSI scoring. They suggested a cut-off point of 2 for the MNSI procedure. However, electrophysiological studies should be considered when the patient has signs and symptoms other than those rated by the MNSI, suggesting peripheral nerve involvement, and also because the MNSI is still just a screening test.[18]

W. H. Herman et al (2012) conducted a study to evaluate the performance of the MNSI in detecting distal symmetrical peripheral neuropathy in patients with Type 1 diabetes and to develop new scoring algorithms. Methods: The MNSI was performed by trained personnel at each of the 28 Diabetes Control and Complications Trial/Epidemiology of Diabetes Interventions and Complications clinical sites. Neurologic examinations and nerve conduction studies were performed during the same year. Confirmed clinical neuropathy was defined by symptoms and signs of distal symmetrical peripheral neuropathy based on the examination of a neurologist and abnormal nerve conduction findings in ≥ 2 anatomically distinct nerves among the sural, peroneal, and median nerves**.** Results: They studied 1184 subjects with Type 1 diabetes. The mean age was 47 years and the duration of diabetes was 26 years. Thirty percent of participants had confirmed clinical neuropathy, 18% had ≥ 4 and 5% had ≥ 7 abnormal responses on the MNSI questionnaire, and 33% had abnormal scores

(≥ 2.5) on the MNSI examination. New scoring algorithms were developed and cut points were defined to improve the performance of the MNSI questionnaire, examination, and the combination of the two. They concluded that altering the cut point to define an abnormal test from ≥ 7 abnormal to ≥ 4 abnormal items improves the performance of the MNSI questionnaire. The MNSI is a simple, non-invasive, and valid measure of distal symmetrical peripheral neuropathy in Type 1 diabetes.[19]

Cristina Muntean et al (2016) studied the efficiency of Michigan neuropathy screening instrument and Nerve conduction studies for the diagnosis of diabetic distal symmetric polyneuropathy (DSPN). The present study aimed to assess the prevalence of DSP in their cohort, characterize it depending on glycemic control, and also to find an easy-to-apply method for DSPN screening that could be used in Romania. They performed a cross-sectional study enrolling 51 patients followed in the Diabetes, Nutrition, and Metabolic Diseases Clinic, Clinical County Hospital of Craiova, Romania. A complete evaluation protocol consisting of clinical examination and Michigan Neuropathy Screening Instrument (MNSI), together with nerve conduction studies were applied for evaluation. Among the type 2 diabetic patients investigated, 72.54% had DSPN**.** Three-quarters of them had poor glycemic control (HbA1c ≥7%). The mean HbA1c level was 9.17%. Poor glycemic control led to a more severe DSP form as proven by nerve conduction studies and clinical examination**.** Allodynia and motor deficit were predominantly found with Hba1c ≥7%. The mean MNSI score for the group was 2.55, strongly correlated with nerve conduction studies**.** They concluded that MNSI is a simple and validated diagnostic tool for DSPN with a strong correlation to electrophysiological parameters. Therefore, its daily implementation in clinical practice could help identify and follow patients at risk for DSPN.[20]

Hamid R. Fateh et al (2015) studied the Correlation between the Michigan neuropathy screening instrument, the United Kingdom screening test, and electrodiagnosis for early detection of diabetic

peripheral neuropathy. The goal of their study was to compare the effectiveness of the Michigan neuropathy screening instrument (MNSI), United Kingdom screening test (UKST), and electrophysiological evaluation in confirming diabetic peripheral neuropathy. Methods: One hundred twenty-five known diabetes mellitus male and female subjects older than 18 with or without symptoms of neuropathy comprised this research. All of them were interviewed in terms of demographic data, lipid profile, HbA1C, duration of disease, and history of retinopathy, so examined by Michigan neuropathy screening instrument (MNSI), United Kingdom screening test (UKST), and nerve conduction studies (NCS). Results: One hundred twenty-five diabetic patients (70 female, 55 male) were recruited in this study with a mean age of 58.7 ± 10.2, and the mean duration of diabetes was 10.17 ± 6.9 years. The mean neuropathy score of MNSI and UKST were 2.3 (1.7) and 4.16 (2.9), respectively. Each instrument detected peripheral neuropathy in 78 (69 %) and 91 (73 %) of patients, respectively. There was a significant relationship between the number of neuropathies and the mean of diabetes duration and development of retinopathy in both questionnaire evaluations and NCS. By nerve conduction study**,** neuropathy was detected in 121 (97 %) diabetic patients, were reported in order 15 (12 %) mononeuropathy (as 33 % sensory and 67 % motor neuropathy) and 106 (85 %) polyneuropathy (as 31 % motor and 69 % sensorimotor neuropathy). They concluded as regards NCS is an objective, simple, and non-invasive tool and also can determine the level of damage and regeneration in peripheral nerves, this study suggests electrodiagnosis as a convenient option for screening, confirming, and follow-up of diabetic peripheral neuropathy.[21]

Diabetic Peripheral Neuropathy (DPN)

Tesfaye S et al (Toronto Diabetic Neuropathy Expert Group) in 2010 gave following definitions of minimal criteria for typical DPN:-

1. Possible DSPN- The presence of symptoms or signs of DSPN may include the following: symptoms–decreased sensation, positive neuropathic sensory symptoms (e.g., “asleep numbness,” prickling or stabbing, burning or aching pain) predominantly in the toes, feet, or

legs; or signs–a symmetric decrease of distal sensation or unequivocally decreased or absent ankle reflexes.

2. Probable DSPN- The presence of a combination of symptoms and signs of neuropathy includes any two or more of the following: neuropathic symptoms, decreased distal sensation, or unequivocally decreased or absent ankle reflexes.

3. Confirmed DSPN- The presence of an abnormality of NCS and a symptom or symptoms or a sign or signs of neuropathy confirm DSPN. If NC is normal, a validated measure of small fibre neuropathy (SFN) (with class 1 evidence) may be used.

4. Subclinical DSPN- The presence of no signs or symptoms of neuropathy are confirmed with abnormal NCS or a validated measure of SFN (with class 1 evidence).[4]

Stages of severity of DSPN

For a given patient with diabetes, it is not sufficient to simply identify patients as having or not having DSPN—severity also needs to be ascertained. PJ Dyck (1988) described the stages of severity:-

- Grade 0 = no abnormality of NCS, e.g., Σ 5 NCS normal deviates <95th percentile or another suitable NC criterion
- Grade 1a = abnormality of NCS, e.g., Σ 5 NCS normal deviates ≥95th percentile without symptoms or signs
- Grade 1b = NCS abnormality of stage 1a plus neurologic signs typical of DSPN but without neuropathy symptoms
- Grade 2a = NCS abnormality of stage 1a with or without signs (but if present, <2b) and with typical neuropathic symptoms
- Grade 2b = NCS abnormality of stage 1a, a moderate degree of weakness (i.e., 50%) of ankle dorsiflexion with or without neuropathy symptoms.

In a standard assessment, the amplitude, conduction velocity, and distal latency of motor fibres of the median and peroneal nerves and the amplitude, conduction velocity and latency of afferent fibres of the median and sural nerve are assessed.[22]

Relationship of Nerve conduction study (NCS) with demographic, clinical and biochemical factors in patients of Type 2 Diabetes Mellitus

Gauhar Hussain et al (2014) conducted a cross-sectional study to evaluate the effect of the duration of type 2 diabetes mellitus (T2DM) on the nerve conduction velocity in diabetic peripheral neuropathy. The objective of the study was to study the nerve conduction velocity in clinically undetectable and detectable peripheral neuropathy in type 2 diabetes mellitus with variable duration. This cross-sectional study was conducted in diagnosed type 2 diabetes mellitus patients. They were divided into groups: Group I (*n* = 37) with clinically detectable diabetic peripheral neuropathy of shorter duration and Group II (*n* = 27) with clinically detectable diabetic peripheral neuropathy of longer duration. They were compared with T2DM patients (*n* = 22) without clinical neuropathy. Clinical diagnosis was based on neuropathy symptom score (NSS) and neuropathy disability score (NDS) for signs. Nerve conduction velocity was measured in both upper and lower limbs. Median, ulnar, common peroneal, and posterior tibial nerves were selected for motor nerve conduction study and median and sural nerves were selected for sensory nerve conduction study. The comparisons were done between nerve conduction velocities of motor and sensory nerves in patients with clinically detectable neuropathy and patients without neuropathy in the type 2 diabetes mellitus population. This study showed significant electrophysiological changes with the duration of the disease. Nerve conduction velocities in lower limbs were significantly reduced even in patients of shorter duration with normal upper limb nerve conduction velocities. They concluded that Diabetic neuropathy symptom score (NSS) and neuropathy disability score (NDS) can help in the evaluation of diabetic sensorimotor polyneuropathy though nerve conduction study is the more powerful test and can help in diagnosing cases of neuropathy.[23]

Muhammad Umer Nisar et al (2015) conducted a study to determine the association of Diabetic Neuropathy with the Duration of Type 2 Diabetes and Glycemic Control. The study was designed with two

aims: 1) to analyze the association of diabetic neuropathy with the glycemic index (levels of fasting blood glucose, random blood glucose, and Hb1Ac) in patients with Type 2 diabetes, and 2) to analyze the association of diabetic neuropathy with time passed since the diagnosis of diabetes. Methods: This case-control study was undertaken between June 2013 and February 2015 at the Armed Forces Institute of Rehabilitation Medicine (AFIRM), Rawalpindi, Pakistan. Type 2 diabetics with an age range of 30-60 years were recruited from outpatient departments of AFIRM, Rawalpindi. Data were collected and recorded on a form with four sections recording the following: 1) demographics of patients and the number of years passed since diagnosis of diabetes; 2) clinical examination for touch, pressure, power, pain, vibration, and ankle reflex; 3) nerve conduction studies for motor components of the common peroneal nerve and tibial nerve and the sensory component of the median nerve and sural nerve; 4) glycemic index, including fasting blood glucose levels (BSF), random blood glucose (BSR) levels, and HbA1c levels. Results: In total, 152 patients were recruited. One-half of those patients had neuropathy (76 patients) and the other half (76 patients) had normal nerve function. The mean (standard deviation [SD]) duration of diabetes was nine years (6.76), BSF levels 7.98 mmol/l (2.18), BSR 9.5 mmol/l (3.19), and HbA1c 6.5% (2.18). Duration since the diagnosis of diabetes and HbA1c levels were significantly associated with the diagnosis of neuropathy in diabetics. They concluded that the presence of diabetic neuropathy was significantly associated with HbA1c levels and the duration of diabetes.[24]

Shivani Agarwal et al (2018) conducted a study to determine various nerve conduction parameters in neurologically asymptomatic diabetic patients in an attempt to evaluate their value in the early detection of subclinical diabetic neuropathy and to find out if any correlation exists. Materials and Methods: This case–control study was carried out on 44 neurologically asymptomatic established patients of Type II DM of both sexes, aged 40–60 years attending the medicine outpatient department (OPD). NCS parameters of various nerves were

studied. Blood sugar and glycosylated hemoglobin (HbA1c) were determined. Results –a longer latency, smaller amplitude, and slower conduction velocity were found in all the nerves**.** Persistence was found to be lower and F-wave minimum latency was prolonged in the cases**.** Sensory and motor NCS were found to be inferior in those with higher HbA1c. Latency, amplitude, and Nerve conduction velocity (NCV) of the sural nerve showed deterioration with the duration of diabetes. All parameters of the median, ulnar, and common peroneal nerves showed deterioration with the duration of diabetes except for NCV in the common peroneal nerve and persistence in the median nerve. They concluded that NCS parameters are valuable for the identification and future prediction of diabetic peripheral neuropathy.[25]

Yi-Ching Weng et al (2020) conducted a cross-sectional study aimed at determining the prevalence of distal symmetrical polyneuropathy (DSPN) and diabetic peripheral neuropathic pain (DPNP) in participants with type 2 diabetes mellitus (T2DM); finding the risk factors for DSPN and DPNP via biochemical tests; and correlating DSPN and DPNP with the results of electrophysiological studies, quantitative sensory tests, and neurologic examination. The 145 participants with T2DM enrolled were divided into the DSPN (abnormal nerve conduction studies (NCS) with signs of polyneuropathy), subclinical DSPN (abnormal NCS without signs of polyneuropathy), minimal DSPN (normal NCS with signs of polyneuropathy), and no DSPN groups. The biochemical risk factors of diabetic peripheral neuropathy were investigated. Neurologic examinations, laboratory tests, NCS, vibration threshold tests, and thermal threshold tests were conducted. The modified Michigan Neuropathy Screening Instrument (mMNSI) and Douleur Neuropathique 4 (DN4) were used to evaluate the severity of DSPN and DPNP, respectively. In all, 30% of participants had DSPN and 11% had DPNP. DSPN correlated strongly with male gender and higher HbA1c levels**;** NCS abnormality correlated with higher HbA1c levels**;** DSPN severity correlated with NCS of each stimulating nerve. DPNP commonly occurred with clinical and electrophysiological

evidence of DSPN. Symptomatic diabetic polyneuropathy significantly correlated with longer disease duration, higher HbA1c levels, and abnormal vibration tests**.** The thermal threshold test combined with nerve conduction tests could detect most of the patients with DSPN, subclinical DSPN, and minimal DSPN. Poor diabetic control was independently associated with the development of DSPN. DPNP was associated with DSPN. The combination of thermal threshold tests with NCS can potentially provide the diagnosis of DSPN.[26]

Abeer Masood et al (2019) conducted a study on the effects of HbA1c Levels on Nerve Conduction Velocity in Type 2 Diabetes Mellitus Patients. Methodology: Total number of 60 subjects (diabetic subjects and healthy controls) were examined to assess Diabetic neuropathy. A sensory Nerve conduction velocity (NCV) test was done along with the estimation of HbA1c levels in all the diabetic subjects (HbA1c≥6.5%) and the healthy controls. Results: The analysis showed that the nerve conduction velocity decreased in diabetic patients with poor glycemic control in comparison to healthy and diabetic subjects with good glycemic control. They concluded that in diabetic subjects there is progressive neuronal involvement which is accelerated by poor glycemic control leading to the development of diabetic neuropathy. Therefore, NCS can be employed for the early detection of neuropathy in diabetic patients.[27]

El-Salem et al (2009) evaluated the correlation of HbA1c levels, using the 7% cut point, with abnormal nerve conduction studies in diabetic patients in the subclinical stage of polyneuropathy. Fifty neurologically asymptomatic diabetic patients were included. HbA1c was measured at the time of inclusion and 3 months later followed by nerve conduction studies. Fifteen women and 35 men were studied. Half of the patients had elevated HbA1c and half had HbA1c <7%. Twenty-six patients (52%) had subclinical neuropathy (18 men, 8 women). In multivariate analysis, HbA1c was the most important factor predicting a higher risk of subclinical neuropathy [adjusted odds ratio 10.71 (2.49, 46.01), P < 0.005]. Therefore, nerve conduction studies abnormalities commonly exist in diabetic patients in the subclinical stages of polyneuropathy,

and are highly correlated to HbA1c levels. Therapies for diabetic neuropathy should target the early stages of the disease.[28]

Josni Khah et al (2021) Relation of glycated hemoglobin with nerve conduction study and proprioception in patients with type 2 diabetes mellitus. 88 patients of T2DM of <5 years duration, between the age group 30 and 60 years, participated in the study. NCS of the tibial motor, peroneal motor, and sural sensory nerves was done. Proprioception was assessed by testing the absolute error scores of knee joint position sense (JPS) with a digital inclinometer. Results: HbA1c showed a positive correlation with distal latency and a negative correlation with amplitude and conduction velocity. JPS errors showed a moderate positive correlation with HbA1c. They concluded that HbA1c values have a significant relationship with the development of peripheral neuropathy in T2DM patients. This effect was observed in both nerve conduction studies as well as on proprioception test.[29]

P. J. Dyck et al (1993) studied the prevalence by staged severity of various types of diabetic neuropathy, retinopathy, and nephropathy in a population-based cohort**.** All Rochester, Minnesota, residents with diabetes mellitus on January 1, 1986, were invited to participate in a cross-sectional and longitudinal study of diabetic neuropathies (and also of other microvascular and macrovascular complications). Of 64,573 inhabitants on January 1, 1986, in Rochester, 870 (1.3%) had clinically recognized diabetes mellitus (National Diabetes Data Group criteria), of whom 380 were enrolled in the Rochester Diabetic Neuropathy Study. Of these, 102 (26.8%) had insulin-dependent diabetes mellitus (IDDM), and 278 (73.2%) had non-insulin-dependent diabetes mellitus (NIDDM). Approximately 10% of diabetic patients had neurologic deficits attributable to nondiabetic causes. Sixty-six percent of IDDM patients had some form of neuropathy; the frequencies of individual types were as follows: polyneuropathy, 54%; carpal tunnel syndrome, asymptomatic, 22%, and symptomatic, 11%; visceral autonomic neuropathy, 7%, and other varieties, 3%. Among NIDDM patients, 59% had various neuropathies; the individual percentages were 45%, 29%, 6%, 5%, and 3%. Symptomatic degrees of

polyneuropathy occurred in only 15% of IDDM and 13% of NIDDM patients. The more severe stage of polyneuropathy, to the point that patients were unable to walk on their heels and also had distal sensory and autonomic deficits (stage 2b) occurred even less frequently--6% of IDDM and 1% of NIDDM patients have sufficiently severe polyneuropathy to be graded stage 2b, and none were graded stage 3. Approximately one-quarter of patients had subclinical carpal tunnel syndrome, but only 7.7% had symptomatic carpal tunnel syndrome. Thus, diabetic peripheral neuropathy is frequent but less severe than generally thought. As generally believed, however, neuropathy, retinopathy, and nephropathy are significantly associated.[30]

Devika Joshi et al (2020) conducted a study that evaluated the association of preclinical peripheral neuropathy using nerve conduction studies with various grades of retinopathy. Methods: Cases of diabetic retinopathy of various grades but asymptomatic for peripheral neuropathy underwent nerve conduction studies of the lower limbs using the Caldwell machine and Sierra wave software. The risk factors for retinopathy and the association of neuropathy with various grades of retinopathy were analyzed by bivariate and multivariate regression analysis. Results: The overall prevalence of neuropathy was 75.6% (sensory 58.54% and combined motor and sensory 17.1%) with an increase in prevalence with the increase in severity of retinopathy. The duration was positively associated with neuropathy (OR = 1.13, 95% CI = 1.02–1.24; *P* = 0.012); moderate nonproliferative diabetic retinopathy (NPDR) (OR = 5.60, *P* = 0.002), severe and very severe NPDR (OR = 5.8, *P* = 0.041), and PDR (OR = 16.05, *P* = 0.000) were significantly at higher risk for having neuropathy as compared to mild NPDR. They concluded that the duration and severity of retinopathy are important risk factors for peripheral neuropathy. There is a high prevalence of peripheral neuropathy among diabetics with retinopathy especially with severe grades, when neuropathy is diagnosed using nerve conduction studies.[31]

Saini DC et al (2021) conducted a study to evaluate the presence of nephropathy and neuropathy in patients with diabetic retinopathy

(DR**)** and to correlate the severity of DR to that of diabetic nephropathy and diabetic neuropathy. Methods: This prospective non-interventional hospital-based study included 57 consecutive cases of DR of either sex, presenting to the eye OPD between January 2019 and November 2020 with a minimum 5-year duration of Type 1 and 2 DM. A complete ophthalmic examination was done and DR was classified according to early treatment in diabetic retinopathy study classification. The severity of diabetic nephropathy was based on urine albumin creatinine ratio and estimated glomerular filtration rate. The severity of diabetic neuropathy was based on nerve conduction velocity. Results: The study was conducted on 57 patients of whom patients 45 were males and 12 were females. Mild nonproliferative diabetic retinopathy was present in 22 patients, moderate in 14 patients, severe in 18 patients, and proliferative diabetic retinopathy in 3 patients. In their study, group of 30 patients of DR presented without clinically significant macular edema (CSME), and 27 patients presented with CSME. The distribution of severity of DR according to CSME was observed to be statistically significant (P<<0.05). The association of the severity of DR with the severity of diabetic nephropathy was observed to be statistically significant (P<<0.05). The association of the severity of DR with that of diabetic neuropathy was inconclusive. They concluded that the association of the severity of DR with the severity of diabetic nephropathy and diabetic neuropathy can be used as a marker for future chronic kidney disease progression and also to prognosticate neurological outcomes in diabetic patients.[32]

Single or simple combination of Nerve Conduction Study (NCS) parameters in detection of Diabetic Peripheral Neuropathy (DPN)

Henning Andersen et al (1997) examined the diagnostic sensitivity of minimal F-wave latency, F-wave persistence, motor conduction velocity (MCV), and amplitude of the compound motor action potential (CMAP) of the median, ulnar, tibial, and peroneal nerves, and of sensory conduction velocity (SCV) and sensory nerve action potential (SNAP) amplitude of the sural nerve in 82 diabetic patients. For the median, ulnar, and tibial nerves the *Z* scores of the minimal F-wave latency

were significantly larger than those of the MCV, and for all four motor nerves, the *Z* scores of the minimal F-wave latency were significantly larger than those of the amplitude of the CMAP. The *Z* scores of the peroneal minimal F-wave latency exceeded those of peroneal MCV, sural SCV, and sural SNAP. F-wave persistence did not differ significantly from the reference values. In conclusion, minimal F-wave latency is the most sensitive measure for the detection of nerve pathology and should be considered in electrophysiological studies of diabetic patients.[33]

Alanna Weisman et al (2013) conducted a study to determine the performance of single and simple combinations of NCS parameters for the identification and future prediction of DSPN. Materials and Methods: 406 participants (61 with type 1 diabetes and 345 with type 2 diabetes) with a broad spectrum of neuropathy, from none to severe, underwent NCS to determine the presence or absence of DSP for cross-sectional (concurrent validity) analysis. The 109 participants without baseline DSPN were re-evaluated for its future onset (predictive validity). The performance of NCS parameters was compared by the area under the receiver operating characteristic curve (AUROC). Results: At baseline, there were 246 (60%) Prevalent Cases. After 3.9 years of mean follow-up, 25 (23%) of the 109 Prevalent Controls that were followed became Incident DSPN Cases. Threshold values for peroneal conduction velocity and sural amplitude potential best identified Prevalent Cases (AUROC 0.90 and 0.83, sensitivity 80 and 83%, specificity 89 and 72%, respectively). Baseline tibial F-wave latency, peroneal conduction velocity, and the sum of three lower limb nerve conduction velocities (sural, peroneal, and tibial) best predicted 4-year incidence (AUROC 0.79, 0.79, and 0.85; sensitivity 79, 70, and 81%; specificity 63, 74 and 77%, respectively). Discussion: Individual NCS parameters or their simple combinations are valid measures for the identification and future prediction of DSPN. Further research into the predictive roles of tibial F-wave latencies, peroneal conduction velocity, and the sum of

conduction velocities as markers of incipient nerve injury are needed to risk-stratify individuals for clinical and research protocols.[34]

Kayihan Uluc et al (2008) conducted a study to evaluate the medial plantar and dorsal sural NCS in a group of diabetic patients with distal sensory neuropathy (DSN) and in healthy controls. The clinical utility of nerve conduction studies (NCS) of the medial plantar and dorsal sural nerves in the early detection of polyneuropathy has already been shown separately. However, at present, there is no data about the combined assessment of these two nerves in distal sensory neuropathy. In the present study, they aimed to evaluate the medial plantar and dorsal sural NCS in a group of diabetic patients with distal sensory neuropathy (DSN) and in healthy controls. Methods: Thirty healthy and 30 diabetic adult patients were included. In all subjects, peripheral motor and sensory NCS were performed bilaterally with surface electrodes on the lower limbs including medial plantar and dorsal sural nerves. In addition, motor and sensory nerves were studied unilaterally on the upper limb. Results: In all patients, nerve action potential (NAP) amplitudes of sural and superficial peroneal nerves were within normal ranges, but in the patient group mean value was significantly lower than in the controls**.** Among clinically defined 30 DSN patients, medial plantar NAP amplitude was abnormal in 18 (60%) and dorsal sural nerve amplitude was abnormal in 13 (40%) of the patients bilaterally. Additionally, the onset NCV of the dorsal sural nerve was significantly slower in patients than in controls (P=0.038). Evaluation of both of these nerves increased the sensitivity by up to 70% in the detection of neuropathy. They concluded that Bilateral NCS assessment of both the medial plantar and dorsal sural nerves together increases the rate of diagnosis of diabetic distal sensory neuropathy compared to assessment of either of these nerves. Assessment of medial plantar in addition to dorsal sural NCS together increases the sensitivity in the detection of neuropathy and allows earlier diagnosis, especially when routine NCS are normal**.**[35]

Raffaele Galiero et al (2021) conducted a study to assess the ability of whole plantar nerve (WPN) conduction in diabetic PN early diagnosis.

According to diabetic PN length-dependent pattern, neurophysiological evaluation of foot-sole nerves might increase NCS diagnostic sensitivity, hence allowing early diagnosis of PN. Method: This was a single-centre prospective observational cohort study on 70 T2DM patients referred to the Internal Medicine Unit of A.O.U. “Luigi Vanvitelli” between October 2019/October 2020. The primary endpoint was WPN efficacy assessment in PN early detection. As secondary, they evaluated (*i*) a potential cut-off of SNAPs amplitude by WPN and (***ii***) WPN diagnostic accuracy vs. gold-standard distal sural nerve conduction**.** Results: ROC curve analysis allowed to establish two potential cut-offs for people aged ≤60 years (AUROC: 0.83, 95%CI: 0.69–0.96, $p < 0.001$) and ≥60 years (AUROC: 0.76, 95%CI: 0.59–0.93, $p = 0.017$). In-depth, they fixed a cut-off of WPN-SNAP amplitude of 4.55 μV and 2.65 μV, respectively, with subsequent 48 patients classified as PN-T2DM. They concluded that their data support WPN conduction study reliability in characterizing the most distal sensory nerve fibres in lower limbs. Thus, WPN may represent an extremely useful diagnostic tool for diabetic PN early detection**.**[36]

Sympathetic Skin Response (SSR) in detection of Diabetic Peripheral Neuropathy (DPN) and its correlation with Nerve conduction study (NCS), demographic, clinical and biochemical factors

Enayat Niakan et al (1988) conducted a study to determine the sensitivity of the sympathetic skin response test (SSR) for the detection of sudomotor dysfunction and its correlation with other autonomic function tests, autonomic symptoms, and degree of peripheral neuropathy. There were 72 diabetic patients with clinical evidence of sensorimotor peripheral neuropathy investigated to determine the sensitivity of the sympathetic skin response test (SSR) for detection of sudomotor dysfunction and its correlation with other autonomic function tests, autonomic symptoms, and degree of peripheral neuropathy. Nerve conduction velocities (NCV) were abnormal in all patients, SSR was absent in 60 of 72 patients (83%), Valsalva test was abnormal in 32 of 67 patients (48%) who had the test, and 6 of 72 (9%) had

orthostatic hypotension. A statistically significant correlation was found between the Valsalva test abnormality, the degree of peripheral neuropathy, and the SSR in our patients. All patients with orthostatic hypotension had an absent SSR and an abnormal Valsalva test. Most patients had one or more autonomic signs or symptoms. Orthostatic dizziness only correlated with SSR, however. Their results suggested that sudomotor activity detected by sympathetic skin response is a valuable test for the investigation of dysautonomia in diabetic peripheral neuropathy.[37]

Nazhel B et al (2002) conducted a study to perform SSR in diabetic patients to see whether this test can be used as an electrophysiological method for the diagnosis and confirmation of diabetic autonomic neuropathy. Method: 20 diabetic patients who had electrophysiologically confirmed polyneuropathy but showed no symptoms or signs referable to autonomic system dysfunction were included. 14 (70%) patients demonstrated abnormal SSR. 2 abnormal patterns were observed. An absent response in at least one tested lower extremity (50%) and prolonged foot with normal hand latency (20%). 6 patients (30%) demonstrated no abnormalities. Foot and hand latencies in diabetics did not differ significantly from those of normal controls (p: 0.4, p: 0.1) and no correlation could be found with latencies and duration of sickness, patient's age, and HbA1c values. They believed latency measurement is an objective measure of conduction in multi-neural pathways and can detect subclinical involvement of the sympathetic nervous system in diabetics who do not manifest symptoms or signs referable to autonomic system dysfunction.[38]

Vibration Perception Threshold (VPT) in detection of Diabetic Peripheral Neuropathy (DPN) and its correlation with Nerve conduction study (NCS), demographic, clinical and biochemical factors

Matthew J Young et al (1994) conducted a study to assess the ability of vibration perception threshold (VPT) to predict the development of diabetic foot ulceration. A prospective follow-up study of consecutive patients with vibration perception was measured by biothesiometry

from April 1988 to March 1989. Patients were stratified into various risk groups. Results: Patients with a VPT < 15 V had a cumulative incidence of foot ulceration of 2.9% compared with 19.8% in patients with a VPT > 25 V, odds ratio (OR) 7.99 (3.65-17.5, 95% confidence intervals), P < 0.01. The incidence of ulceration increased with the duration of diabetes, but even with this effect removed, the excess of ulceration persisted, OR 6.82 (2.75-16.92), P < 0.01. They concluded that VPT is an effective predictor of the risk of foot ulceration in diabetes and therefore could be used to target foot-care education to those patients most likely to benefit and, thereby, possibly improve its effectiveness.[39]

Jeewandeep Kaur et al (2016) studied Vibration Perception Threshold (VPT) as a stand-alone method for identifying distal symmetrical peripheral neuropathy relative to gold standard assessments involving neurology examinations and nerve conduction studies. The first, definite clinical neuropathy, indicates the presence of symptoms and signs consistent with DSPN based on history and physical examination by a board-certified neurologist. The second, abnormal nerve conduction represents one or more abnormal nerve conduction results (amplitude, conduction velocity, or F response latency) in two different peripheral nerves among the median (sensory or motor), peroneal motor, or sural sensory studies. Finally, confirmed clinical neuropathy was defined as the presence of both definite clinical neuropathy and abnormal nerve conduction. Results: In this study, they determined VPT and nerve conduction along with signs and symptoms of peripheral neuropathy in 30 subjects with type 2 diabetes. In the study, they found VPT as a reliable measure of DSPN (Distal Symmetrical Polyneuropathy) and a sensitive and specific measure of definite clinical neuropathy with the highest sensitivity noted for definite clinical neuropathy (74.07%). The sensitivity of VPT to predict abnormal nerve conduction and confirmed clinical neuropathy was 50%. They concluded VPT is a sensitive indicator of definite clinical neuropathy but this analysis does not address the utility of VPT as a measure of

disease severity or the ability of VPT to measure change in neuropathy status over time.[40]

Solanki et al (2022) studied the prevalence and correlates of vibration perception threshold based diabetic peripheral neuropathy in the Gujarati urban population. A cross-sectional study was performed on 100 under-treatment urban type 2 diabetics. Using bioesthesiometer, they tested VPT from the sole of the lower limbs of each participant. VPT >25 was considered as DPN. Mean age was 57, mean duration was 9.42 years, 40% were good glycemic, 28% were symptomatic for neuropathy, half subjects had co-existing hypertension and positive family history. VPT >25 was prevalent in 38% participants and mild, moderate, severe grades of DPN were present in 10%, 20%, 38%, respectively. VPT was associated with all three measures of glycemic control both quantitatively and qualitatively imposing significant odds risk (3.45, 2.63, 3.63 for HbA1C, Fasting plasma glucose, 2h PG, respectively). The presence of symptoms, duration, and family history were significant predictors of VPT, whereas age, gender, hypertension, hyperlipidemia, and glycemic control were not**.** In chronic type 2 diabetics from a city in Gujarat, they reported a 38% prevalence of DPN, related to symptoms, duration, family history, and all measures of glycemic triad. Unrelated to age and gender, VPT is superior to symptoms to detect DPN and it should be used optimally to insinuate timely preventive measures.[41]

Ankle-Brachial Index (ABI) in detection of Vasculopathy and its correlation with Nerve conduction study (NCS), demographic, clinical and biochemical factors

L.Potier et al (2010) studied the Use and Utility of the Ankle Brachial Index in Patients with Diabetes. They found that in diabetic patients, it has some specific caveats. The sensitivity of the standard threshold of 0.9 appears to be lower in diabetic patients with complications. Moreover, highly frequent arterial medial calcifications in diabetes increase ABI. It has been demonstrated that measurements >1.3 are well correlated with both an increased prevalence of PAD and CV risk. Therefore, ABI thresholds of less than 0.9 and more than 1.3 are highly

suspicious for PAD and high CV risk in diabetic patients. However, when there is concomitant clinical peripheral neuropathy or a high risk of arterial calcification, the efficiency of ABI seems to be limited. In this case, other methods should be applied, toe pressure, in particular. Thus, the ABI could be used in patients with diabetes, but values should be interpreted with precision, according to the clinical situation.[42]

Liliana Chevtchouk et al (2017) conducted a study to evaluate neuropathic pain and peripheral vascular disease in diabetics and compare this with the length of time since diagnosis in type 1, and type 2 diabetes. A cross-sectional study with 225 diabetics was chosen from their responses on the DN4 questionnaire, who were then evaluated with the ankle-brachial index (ABI), separating type 1 diabetes from type 2 diabetes. Results: A higher incidence of neuropathic pain in those over 60 years of age showed an ABI > 1.3. Neuropathic pain was related to an abnormal ABI in 144 patients (64.2%). A statistically significant value was obtained in type 2 diabetes patients more than 10 years from disease onset, 69 with altered ABI and 25 with normal ABI**.** There was an altered ABI (< 0.9) observed in 33% of type 1 diabetes patients and 67% of type 2 diabetes patients. They concluded that the ABI test in type 1 diabetes and type 2 diabetes patients is important even in those who are asymptomatic. A diagnosis of more than 10 years prior, regardless of the presence of neuropathic pain or ischemic signs, altered the ABI.[43]

Hidetaka Hamasaki et al (2017) evaluated diabetic neuropathy by a novel device. They conducted a retrospective observational study in patients with diabetes whose sural nerve functions were measured using DPN Check between January 2015 and October 2016. Multiple and logistic regression analyses were conducted to assess the associations of sural nerve conduction velocity (SNCV) and amplitude (SNAP) with clinical parameters related to DN. Results: A total of 740 patients were enrolled in this study. At baseline, 211 patients were diagnosed with DN by using DPN Check. The sensitivity, specificity, and positive likelihood ratio of DPN Check compared with ankle reflex

as reference were 81%, 46%, and 1.5, respectively. Of these, 182 patients were followed up for approximately 1 year to measure changes in SNCV and SNAP. Both SNCV and SNAP were inversely associated with the duration of diabetes, plasma glucose levels, and hemoglobin A1c levels at baseline, whereas these were positively associated with ankle–brachial index**.** Logistic regression analysis revealed that poor glycemic control was associated with an increased risk of reduction in both SNCV [odds ratio = 1.570; 95% confidence interval (CI) = 1.298–1.898; $p < 0.001$] and SNAP (odds ratio = 1.408; 95% CI = 1.143–1.735; $p = 0.001$) and longer duration of diabetes was also significantly associated with an increased risk of reduction in both SNCV (odds ratio = 1.058; 95% CI = 1.032–1.084; $p < 0.001$) and SNAP (odds ratio = 1.049; 95% CI = 1.019–1.079; $p = 0.001$). They concluded that sural nerve functions were significantly associated with glycemic control and arteriosclerosis in patients with diabetes**.** DPN Check may be useful as a screening tool to identify DN in clinical practice.[44]

Iftikhar Haider Naqvi et al (2018) conducted a study titled Peripheral Neuropathy and Vasculopathy; Frequency and Associated Risk Factors in Newly Diagnosed Treatment Naive Type 2 Diabetes. It was a cross-sectional non-interventional cohort study where all newly diagnosed treatment naïve type 2 diabetic patients were enrolled. Peripheral neuropathy and vasculopathy were detected by the Michigan neuropathy screening instrument (MNSI) and ankle-brachial index (ABI) respectively. Peripheral neuropathy was confirmed or diagnosed when a patient on a 10-point scale has an MNSI score of ≥2.5. The vascular status of the extremity was determined by the ankle-brachial index (ABI). Peripheral vasculopathy was labelled when ABI values of ≤0.89 against 0.9 of normal. They found that 37.7% had early neuropathy with an MNSI score of 3.3 ± 0.4. 20.6% had vasculopathy with an ABI score of 0.76 ± 0.11. Age, duration of symptoms, high HbA1C %, albumin creatinine ratio, and cholesterol level were found as risk factors for early neuropathy and vasculopathy. They concluded that peripheral neuropathy and vasculopathy are

frequently reported complications among newly diagnosed treatment naïve patients of type 2 DM. Age, duration of symptoms before diagnosis, metabolic parameters like raised HbA1C, hyperlipidemia, and spot random albumin creatinine ratio are found to be risk factors for both peripheral neuropathy and vasculopathy.[45]

Uni Gamayani et al (2019) studied the Correlation between Ankle-Brachial Index Score and Diabetic Polyneuropathy Degree of Severity. The severity of DPN is categorized based on symptoms, signs, and nerve conduction study (NCS) abnormality into grades 0, 1a, 2a, and 2b. Pathogenesis of DPN consists of metabolic and vascular processes. In addition, macrovascular factor also plays a role in the pathogenesis of DPN. Macrovascular diseases, such as peripheral arterial disease (PAD), could be diagnosed using the ankle-brachial index (ABI). Several studies have proven a strong correlation between ABI and DPN; hence, this study aimed to examine the correlation between ABI score and DPN severity. This was a cross-sectional analytic study on 73 type 2 DM patients who met the inclusion and exclusion criteria and visited the outpatient Endocrine Clinic and Neurophysiology laboratory of the Department of Neurology Dr. Hasan Sadikin General Hospital Bandung, during the period from June to October 2018. ABI examinations were performed after DPN indication was evident from the results of physical examination, lab tests, and NCS. No correlation was found between ABI score and DPN severity and between ABI score and DPN symptoms, signs, and NCS abnormality. Hence, the ABI score does not correlate with the DPN severity stage.[46]

MATERIAL AND METHODS

An observational non-blinded cross-sectional study was conducted in the Department of Neurology in DMCH, Ludhiana. Patients of Type 2 Diabetes Mellitus (T2DM) were enrolled in the study from neurology and endocrinology outpatient departments. Total duration of study was one and half years with sample size of 125.

Inclusion and exclusion criteria

Patients aged more than 40 years with a diabetes duration exceeding 1 year were included in the study. American Diabetes Association (ADA) criteria[47] was used for diagnosis of Diabetes Mellitus.

Patients with history of macrovascular disease (cardiac, cerebral, or peripheral vascular disease), chronic liver or chronic renal failure, other causes of neuropathy like cobalamin deficiency, hypothyroidism, autoimmune disease, paraproteinemia, history of exposure to chemotherapeutic agents or heavy metals or history of abuse of illicit drugs or alcoholism within 1 year were excluded from the study.

Demographic details, history and biochemical investigation

Written informed consent was taken from all patients and protocol approved by the Institutional Ethics Committee was followed. Demographic details and history was taken from all patients. Biochemical investigations like Fasting blood glucose, Glycosylated hemoglobin (HbA1c) levels and Spot Urine albumin creatinine ratio (UACR) were noted from patient's records. UACR 30-300 mg/g (microalbuminuria) is widely accepted as the first clinical sign of diabetic nephropathy.[48] UACR >30 was considered as Diabetic nephropathy.

Clinical assessment of peripheral neuropathy

Clinical assessment of peripheral neuropathy was done using Michigan Neuropathy Screening Instrument (MNSI). MNSI is designed to screen for the presence of diabetic neuropathy. The MNSI is designed to be used in an outpatient setting by primary care or other providers. The first part of the screening instrument, the history questionnaire, consists of 15 self-administered "yes or no" questions on foot

sensation including pain, numbness and temperature sensitivity. Responses are added to obtain a total score. 'Yes' responses to questions 1–6, 8–12, 14–15 are each counted as one point. 'No' responses to questions 7 and 13 are each counted as one point.[5] Maximum possible score is 15 points, a score of ≥ 4 was considered as positive.[19] A higher score indicates more neuropathic symptoms.

The second part of the MNSI is a brief physical assessment by health professional. During the MNSI examination, a health professional inspects each foot for deformities, dry skin, calluses, infections and fissures. Each foot with any abnormality receives a score of 1. Each foot is also inspected for ulcers and each foot with an ulcer receives a score of 1. The ankle reflexes are also elicited. If the reflex is absent, the patient is asked to perform the Jendrassik maneuver and, if present, the reflex is designated as present with reinforcement and is scored as 0.5. If the reflex is absent with the Jendrassik maneuver, the reflex is designated as absent and is scored as 1. Vibration sensation is then tested in the great toe using a 128-Hz tuning fork. In general, the examiner should be able to feel vibration in his or her hand for 5 s longer than a normal subject can at the great toe. Vibration is scored as present if the examiner senses the vibration on his or her finger for < 10 s longer than the subject feels it in the great toe, decreased if sensed for ≥ 10 s (scored as 0.5) or absent (scored as 1). For the monofilament test, eight correct responses out of 10 applications is considered normal: one to seven correct responses indicates reduced sensation and no correct answers translates into absent sensation.[5] The total possible score is 10 points and, a score ≥ 2 was considered as positive.[18] Foot photographs were taken in all patients.

Nerve conduction study (NCS)

Nerve conduction study (NCS) was done using Nihon Kohden EMG/EP Measuring System, System model MEB-9400K. NCS was performed by conventional supramaximal percutaneous stimulation of the limbs and surface recordings. Median and Ulnar motor and sensory NCS was performed in the upper limbs. Femoral, Peroneal and Tibial motor NCS, Sural, Saphenous, Superficial peroneal sensory NCS and

Medial and Lateral plantar motor and sensory NCS was performed in lower limbs. Distal and proximal latency, distal and proximal amplitude, nerve conduction velocity and F-wave latency and persistence was recorded. All the NCS parameters were entered into a structured proforma with corresponding normative data. For latencies ≤ 95th percentile was taken as normal. For amplitudes (CMAP or SNAP) and velocities ≥ 5th percentile was taken as normal. Previously validated normative data of DMCH neurophysiology lab was taken as standard.

For overall assessment of normality or abnormality of NCS, Toronto Diabetic Neuropathy Expert Group criteria[4] and criteria given by PJ Dyck[22] was applied.

Medial motor distal latency, Peroneal motor distal latency, Median sensory latency and Sural sensory latency were recorded. Average of latencies of left and right side was calculated for each nerve. All the average latencies for each nerve were added. If the sum of averages was more than the sum of 95th percentile cutoff value for each nerve then it was considered as abnormal.

Medial motor distal amplitude, Peroneal motor distal amplitude, Median sensory amplitude and Sural sensory amplitude was recorded. Average of amplitudes of left and right side was calculated for each nerve. All the average amplitudes for each nerve were added. If the sum of averages was less than the sum of 5th percentile cutoff value for each nerve then it was considered as abnormal.

Medial motor velocity, Peroneal motor velocity, Median sensory velocity and Sural sensory velocity was recorded. Average of velocities of left and right side was calculated for each nerve. All the average velocities were added. If the sum of averages were less than the sum of 5th percentile cutoff value for each nerve then it was considered as abnormal.

For overall assessment of Normality or abnormality of NCS, if any of the three (sum of average latencies/ sum of average amplitudes/ sum of average velocities) was abnormal then the NCS was considered as abnormal.

Impression of Nerve conduction study was noted separately as per report issued.

Classification of Diabetic Peripheral Neuropathy (DPN)

All patients included in the study were then classified according to definitions of minimal criteria for typical Diabetic Peripheral Neuropathy (DPN) as given by Toronto Diabetic Neuropathy Expert Group[4]

- Confirm DSPN- The presence of an abnormality of NCS and symptoms or signs of neuropathy. If NCS was abnormal and either MNSI-A or MNSI-B was positive than it was considered as Confirmed DSPN.
- Probable DSPN- The presence of a combination of symptoms and signs of neuropathy with normal NCS. If NCS was normal and both MNSI-A and MNSI-B were positive than it was considered as Probable DSPN.
- Possible DSPN- The presence of symptoms or signs of DSPN with normal NCS. If NCS was normal and either MNSI-A or MNSI-B was positive than it was considered as Possible DSPN.
- Subclinical DSPN- The presence of abnormal NCS without symptoms or signs of polyneuropathy. If NCS was abnormal and MNSI-A and MNSI-B were both negative than it was considered as Subclinical DSPN.

Stages of severity of Distal Symmetric Polyneuropathy (DSPN)

In addition patients were also classified based on criteria for stages of severity of DSPN as given by PJ Dyck[22]

- Grade 0 = no abnormality of NCS. If NCS was normal than it was considered as Grade 0.
- Grade 1 = abnormality of NCS without symptoms with or without signs. If NCS was abnormal and MNSI-A was negative and MNSI-B was positive or negative than it was considered as Grade 1.
- Grade 2 = abnormality of NCS with typical neuropathic symptoms with or without signs. If NCS was abnormal and MNSI-A was positive and MNSI-B was positive or negative than it was considered as Grade 2.

Sympathetic skin response (SSR)

Sympathetic skin response (SSR) test was performed in both upper limbs and lower limbs. Latency in all the four limbs were recorded and entered into a structured proforma. If any of the latency was more than the upper limit of normal or non-recordable than SSR was considered as abnormal. Latency in hand has been reported to be 1.6±0.1s and that in the foot has been reported to be 2.1±0.1s.[49] Latency in upper limb >1.7 s (>1700 ms) or Latency in lower limb >2.2 s (>2200 ms) was taken as abnormal.

Assessment of Vibration Perception Threshold (VPT) and Ankle-brachial index (ABI)

The Vibration Perception Threshold (VPT) and Ankle brachial index (ABI) was measured by Biothesiometer Cum Vascular Doppler-VIBRODOP.

For measuring VPT a metal probe was placed under the toes of the patient and the voltage was increased gradually from zero and the transition from no vibration to the point of vibration was marked as VPT. Average of three measurements was taken to calculate the VPT value of the given patient. In VPT, the electric current mode is converted into vibration mode. VPT measures large nerve fibre integrity and perception is normally poorer in lower extremity than the upper extremity. Vibration perception threshold (VPT) <15 is Normal, 15-20 is Mild, 20-25 is Moderate and >25 is Severe.[10] VPT>15 was considered as abnormal.

Ankle brachial index (ABI) is a simple method to screen peripheral arterial disease (PAD) and to evaluate cardiovascular (CV) prognosis in the general population. The ankle-brachial index (ABI) is the ratio of the systolic blood pressure (SBP) measured at the ankle to that measured at the brachial artery. ABI was measured using a hand-held Doppler probe. ABI is an effective tool for clinical practice or clinical studies.[42] Ankle Brachial Index (ABI) <0.9 was considered as abnormal.[45]

Fundoscopy

The fundoscopy findings were noted in accordance with the Early Treatment for Diabetic Retinopathy Study (ETDRS) classification[50] to divide the patients into one out of five categories:-

1. No Diabetic Retinopathy (DR)
2. Mild non-proliferative diabetic retinopathy (NPDR): at least one microaneurysms; criteria not met for other levels of DR.
3. Moderate NPDR: microaneurysms or hemorrhages along with soft exudates, venous beading, and intra-retinal microvascular abnormalities.
4. Severe NPDR: microaneurysms or hemorrhages in all four quadrants, venous beading in two or more quadrants, intraretinal microvascular abnormalities in at least one quadrant.
5. Proliferative diabetic retinopathy (PDR): neovascularization and/or vitreous or pre-retinal hemorrhage.

OBSERVATION AND RESULTS

We conducted a hospital based observational cross-sectional study. The study participants were recruited from patients visiting Neurology and Endocrinology OPD at DMCH. The patients were enrolled after taking informed consent. 125 patients aged more than 40 years and duration of diabetes more than 1 year were included in the study after satisfying inclusion and exclusion criteria during the span from September 2021 to March 2023.

Table 1: Demographic and biochemical data of study population

	N	Minimum	Maximum	Mean	SD
Age (years)	125	42.00	92.00	61.00	10.23
Duration of Diabetes (years)	125	1.00	30.00	9.28	5.97
Fasting blood glucose (mg/dl)	125	76.00	341.00	161.62	53.97
HbA1c (%)	125	5.70	15.60	8.98	2.31

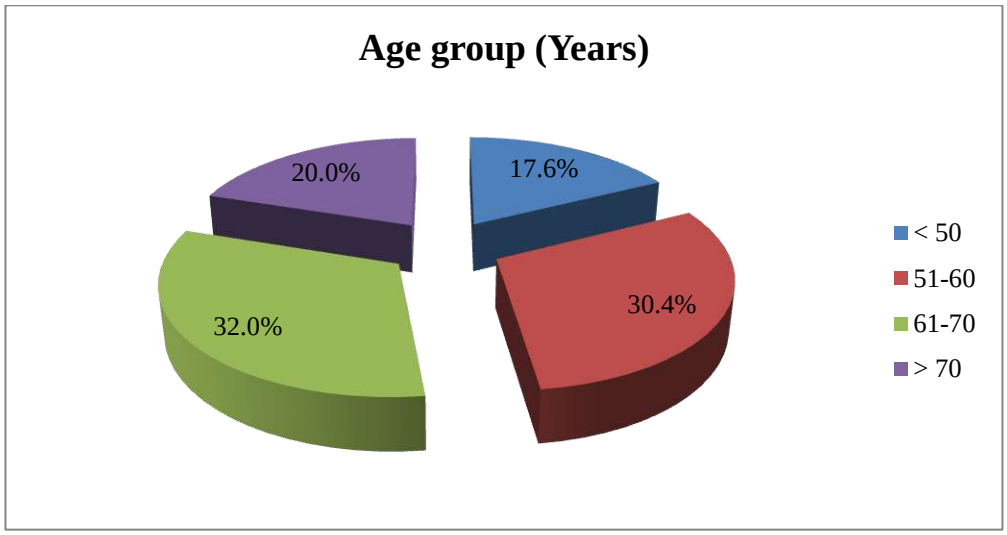
The mean age of study population was 61 ± 10.23 years (range 42-92 years), mean duration of diabetes was 9.28 ± 5.97 years (range 1 to 30 years), mean blood fasting blood glucose was 161 ± 53.97 mg/dl (range 76 to 341 mg/dl) and mean HbA1c was 8.98 ± 2.31% (range 5.7 to 15.6).

Table 2: Distribution of study population based on age of study participants

Age group (Years)	No. of cases	Percentage
< 50	22	17.6%
51-60	38	30.4%
61-70	40	32.0%
> 70	25	20.0%
Total	125	100.0%

For the purpose of analysis, study population was divided into four age groups. 32% (40) participants were in age group 61-70 years, 30.4% (38) were in the age group 51-60 years, 20% (25) were in the age group >70 years and 17.6% (22) were in the age group <50 years. The minimum age of the participant was 42 years, maximum age was 92 years, mean age (SD) was 61 (10.23) years.

Figure 1: Percentage wise distribution of age group of study population.



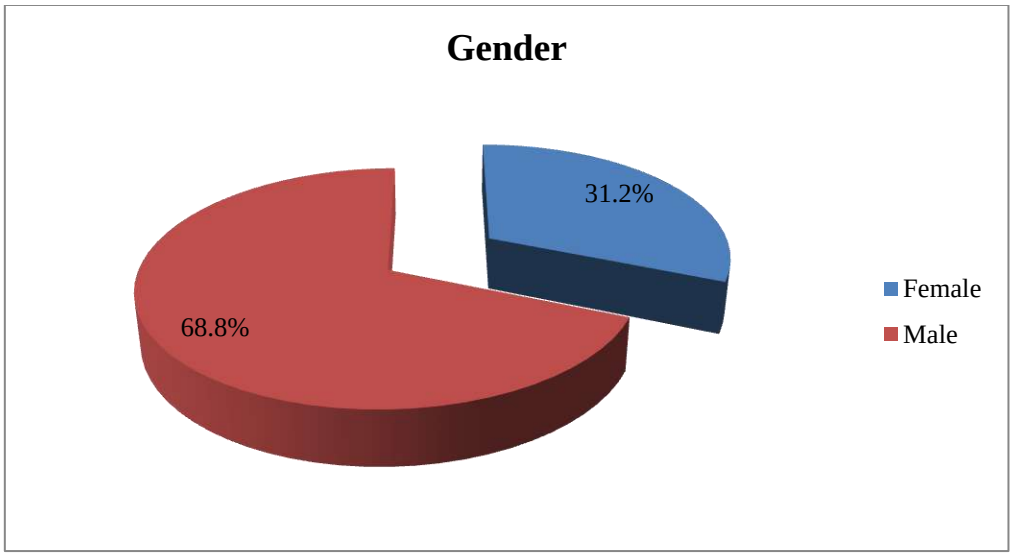
This figure shows percentage wise age group distribution of study population. 32% (40) participants were in age group 61-70 years, 30.4% (38) were in the age group 51-60 years, 20% (25) were in the age group >70 years and 17.6% (22) were in the age group <50 years.

Table 3: Distribution of study population based on gender of study participants

Gender	No. of cases	Percentage
Female	39	31.2%
Male	86	68.8%
Total	125	100.0%

31.2 % (39) participants were female and 68.8 % (86) were male. The male to female ratio was 2.20.

Figure 2: Percentage wise distribution of gender of study population



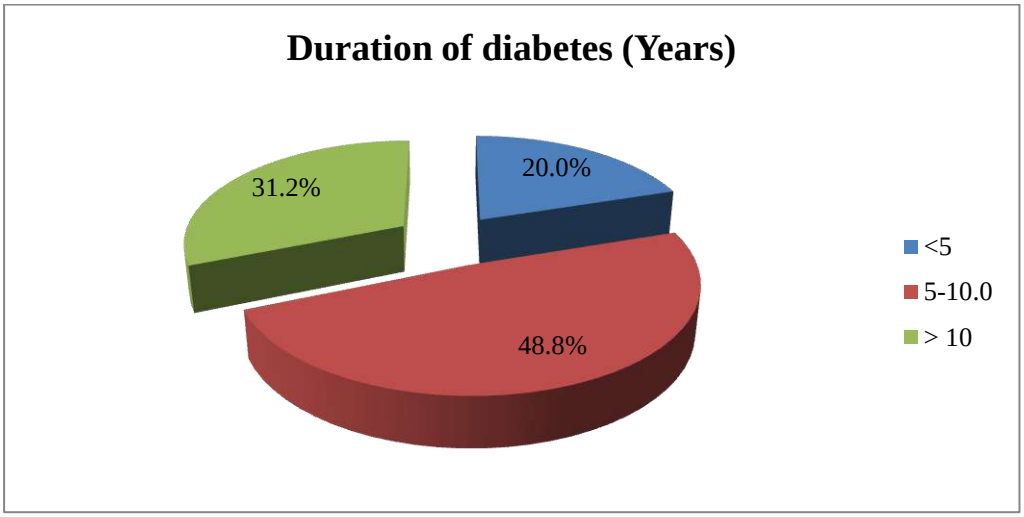
This figure shows that 31.2% (39) participants were female and 68.8 % (86) participants were male.

Table 4: Distribution of study population based on duration of diabetes of study participants

Duration of Diabetes (Years)	No. of cases	Percentage
<5	25	20.0%
5-10	61	48.8%
> 10	39	31.2%
Total	125	100.0%

For the purpose of analysis, study population was divided into three groups based on duration of diabetes. 48.8 % (61) participants had diabetes for 5-10 years, 31.2% (39) participants had diabetes for >10 years, 20% (25) had diabetes for <5 years. The minimum duration of diabetes was 1 year, maximum was 30 years, mean duration (SD) was 9.28 (5.97) years.

Figure 3: Percentage wise distribution of duration of diabetes of study population



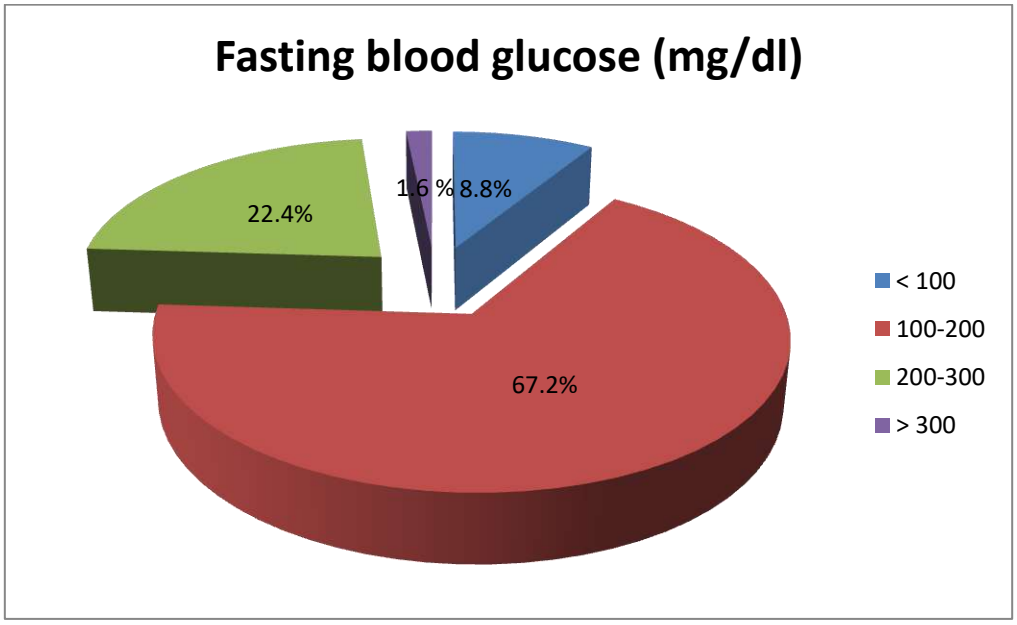
This figure shows that 48.8 % (61) participants had diabetes for 5-10 years, 31.2% (39) participants had diabetes for >10 years, 20% (25) had diabetes for <5 years.

Table 5: Distribution of study population based on Fasting blood glucose (mg/dl) of study participants

Fasting blood glucose (mg/dl)	No. of cases	Percentage
< 100	11	8.8%
100-200	84	67.2%
200-300	28	22.4%
> 300	2	1.6%
Total	125	100.0%

For the purpose of analysis study population was divided into four groups based on fasting blood glucose. 67.2% (84) participants had fasting blood glucose between 100-200 mg/dl, 22.4% (28) had fasting blood glucose between 200-300 mg/dl, 8.8% (11) had fasting blood glucose <100 mg/dl and 1.6% (2) had fasting blood glucose >300 mg/dl.

Figure 4: Percentage wise distribution of study population based on Fasting blood glucose (mg/dl)



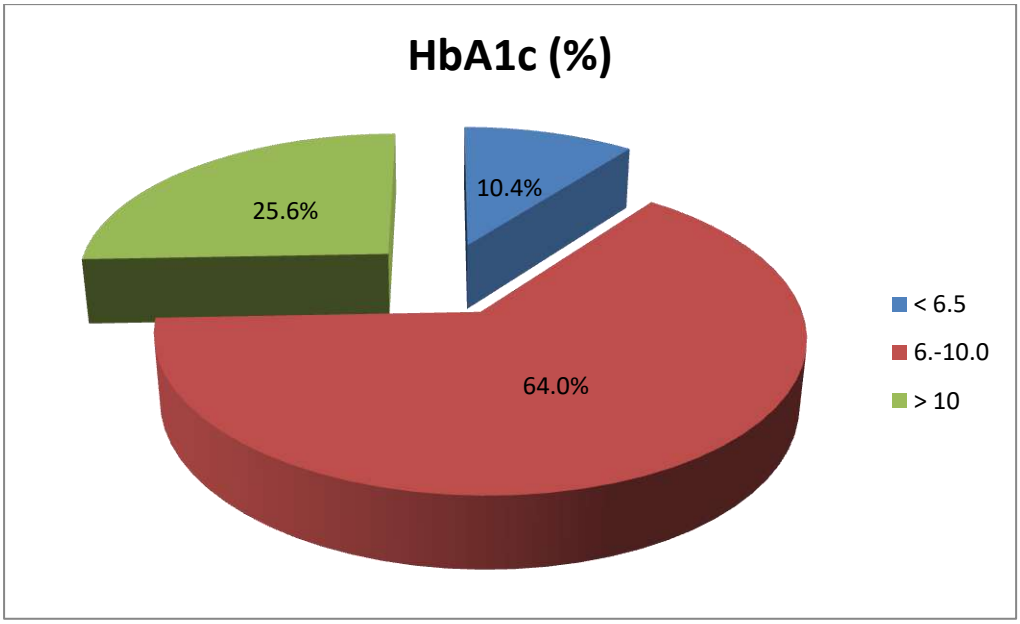
This figure shows that 67.2% (84) participants had fasting blood glucose between 100-200 mg/dl, 22.4% (28) had fasting blood glucose between 200-300 mg/dl, 8.8% (11) had fasting blood glucose <100 mg/dl and 1.6% (2) had fasting blood glucose >300 mg/dl.

Table 6: Distribution of study population based on HbA1c (%) of study participants

HbA1c (%)	No. of cases	Percentage
< 6.5	13	10.4%
6.5-10	80	64.0%
> 10	32	25.6%
Total	125	100.0%

For the purpose of analysis study population was divided into three groups based on HbA1c. 64% (80) participants had HbA1c between 6-10%, 25.6% (32) participants had HbA1c >10%, 10.4% (13) had HbA1c <6.5%.

Figure 5: Percentage wise distribution of HbA1c (%) of study participants



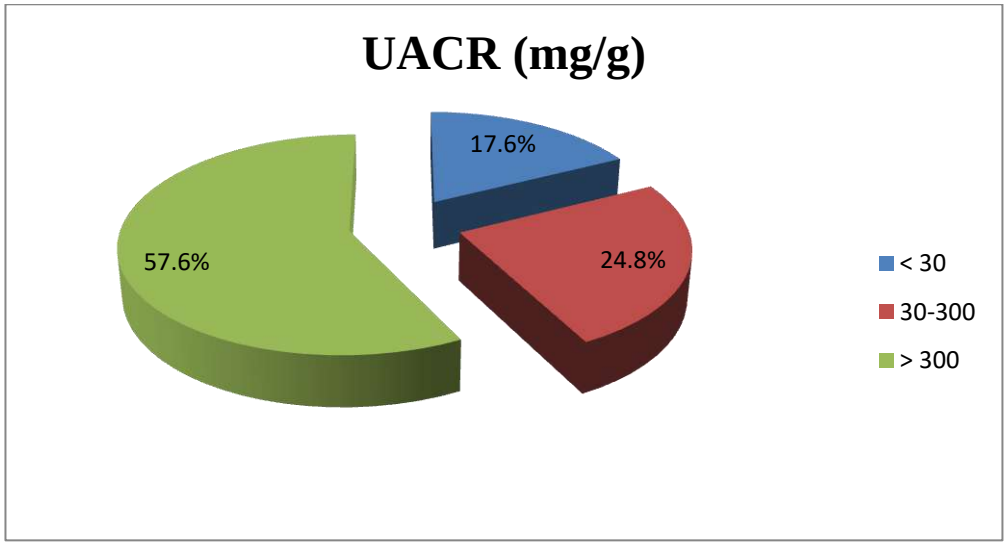
This figure shows that 64% (80) participants had HbA1c between 6-10%, 25.6% (32) participants had HbA1c >10%, 10.4% (13) had HbA1c <6.5%.

Table 7: Distribution of study population based on UACR of study participants

UACR (mg/g)	No. of cases	Percentage
< 30	22	17.6%
30-300	31	24.8%
> 300	72	57.6%
Total	125	100.0%

57.6% (72) participants had UACR>300 mg/g, 24.8% (31) participants had UACR 30-300 mg/g and 17.6% (22) participants had UACR<30 mg/g.

Figure 6: Percentage wise distribution of UACR of study population



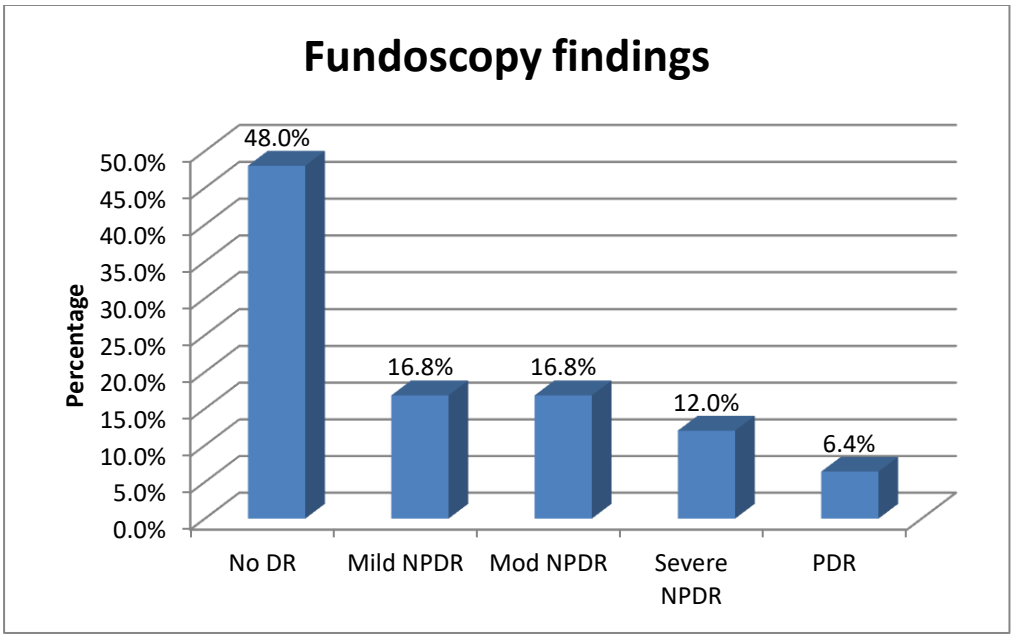
This figure shows that 57.6% (72) participants had UACR>300 mg/g, 24.8% (31) participants had UACR 30-300 mg/g and 17.6% (22) participants had UACR<30 mg/g.

Table 8: Distribution of study population based on Fundoscopy findings of study participants

Fundoscopy findings	No. of cases	Percentage
No DR	60	48.0%
Mild NPDR	21	16.8%
Mod NPDR	21	16.8%
Severe NPDR	15	12.0%
PDR	8	6.4%
Total	125	100.0%

16.8% (21) participants had Moderate NPDR, 16.8% (21) participants had Mild NPDR, 12% had Severe NPDR and 6.4% had PDR.

Figure 7: Percentage wise distribution of Fundoscopy findings of study population



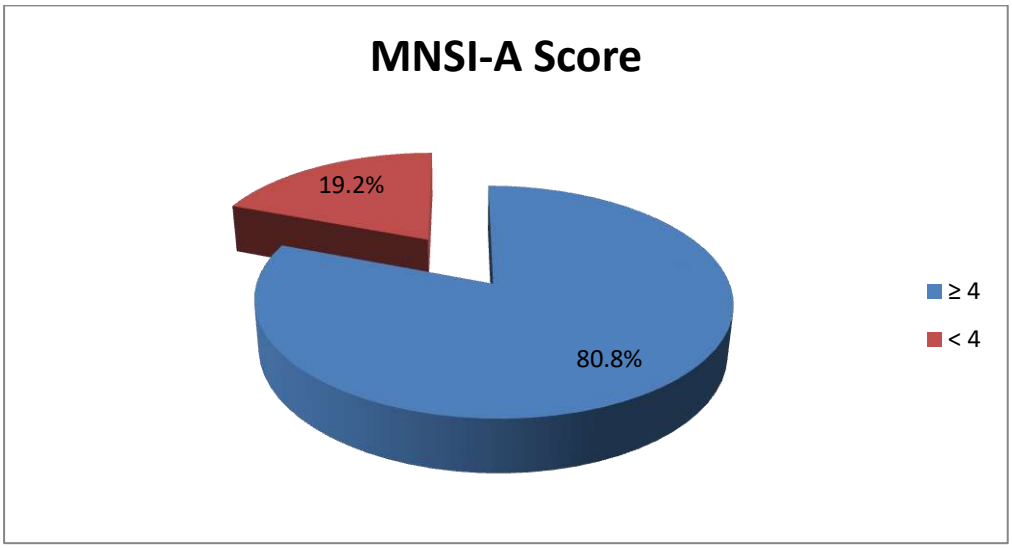
This figure shows that 16.8% (21) participants had Moderate NPDR, 16.8% (21) participants had Mild NPDR, 12% had Severe NPDR and 6.4% had PDR.

Table 9: Distribution of study population based on MNSI-A score of study participants

MNSI-A score	No. of cases	Percentage
≥ 4	101	80.8%
< 4	24	19.2%
Total	125	100.0%

80.8% (101) participants had MNSI-A score ≥4 and 19.2% (24) participants had MNSI-A score <4.

Figure 8: Percentage wise distribution of study population based on MNSI-A score



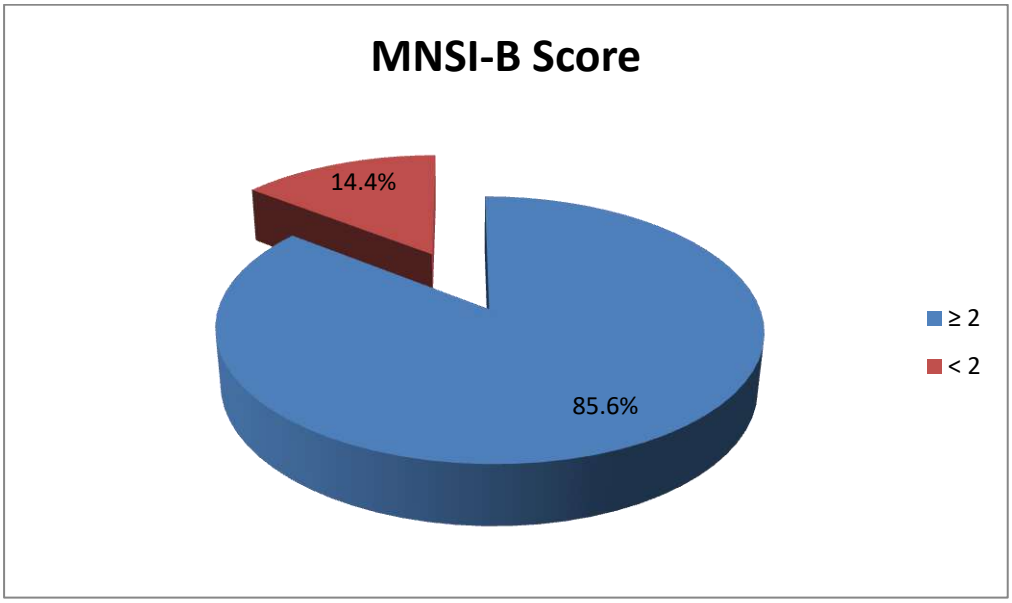
This figure shows that 80.8% (101) study participants had MNSI-A score ≥4 and 19.2% (24) participants had MNSI-A score <4.

Table 10: Distribution of study population based on MNSI-B score of study participants

MNSI-B score	No. of cases	Percentage
≥ 2	107	85.6%
< 2	18	14.4%
Total	125	100.0%

85.6% (107) participants had MNSI-B score ≥2 and 14.4% (18) participants had MNSI-B score <2.

Figure 9: Percentage wise distribution of study population based on MNSI-B score



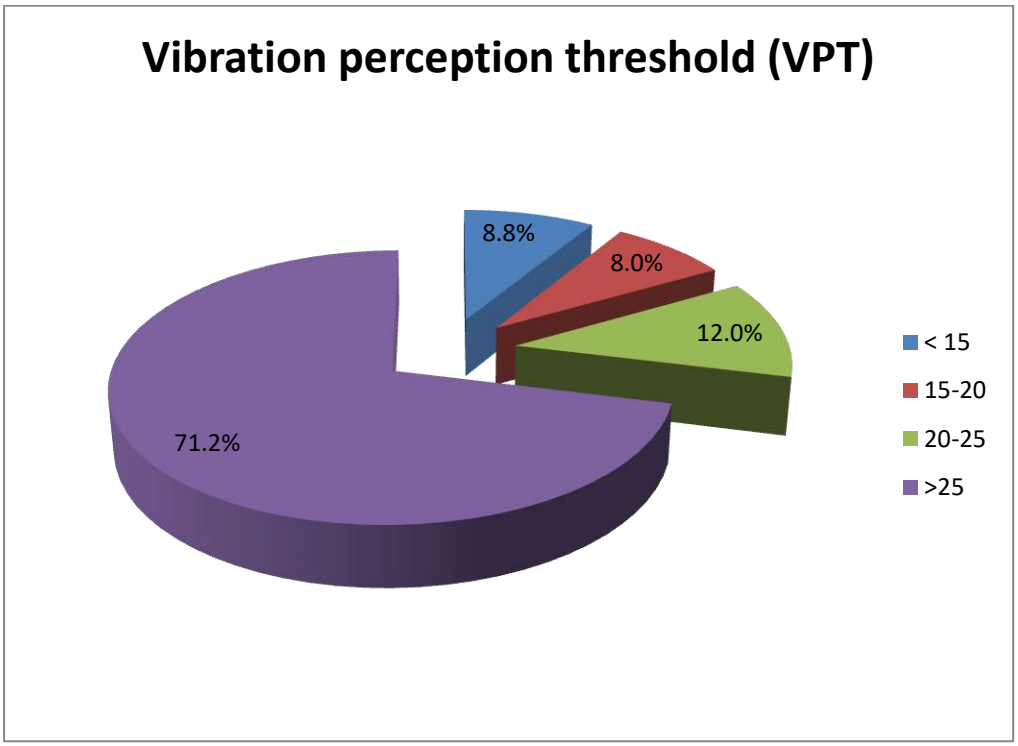
This figure shows that 85.6% (107) participants had MNSI-B score ≥2 and 14.4% (18) participants had MNSI-B score <2.

Table 11: Distribution of study population based on Vibration perception threshold (VPT) of study participants

Vibration perception threshold (VPT)	No. of cases	Percentage
< 15	11	8.8%
15-20	10	8.0%
20-25	15	12.0%
>25	89	71.2%
Total	125	100.0%

Vibration perception threshold was >25 in 71.2% (89), 20-25 in 12% (15), <15 in 8.8% (11) and 15-20 in 8% (10) participants.

Figure 10: Percentage wise distribution of study population based on Vibration perception threshold (VPT)



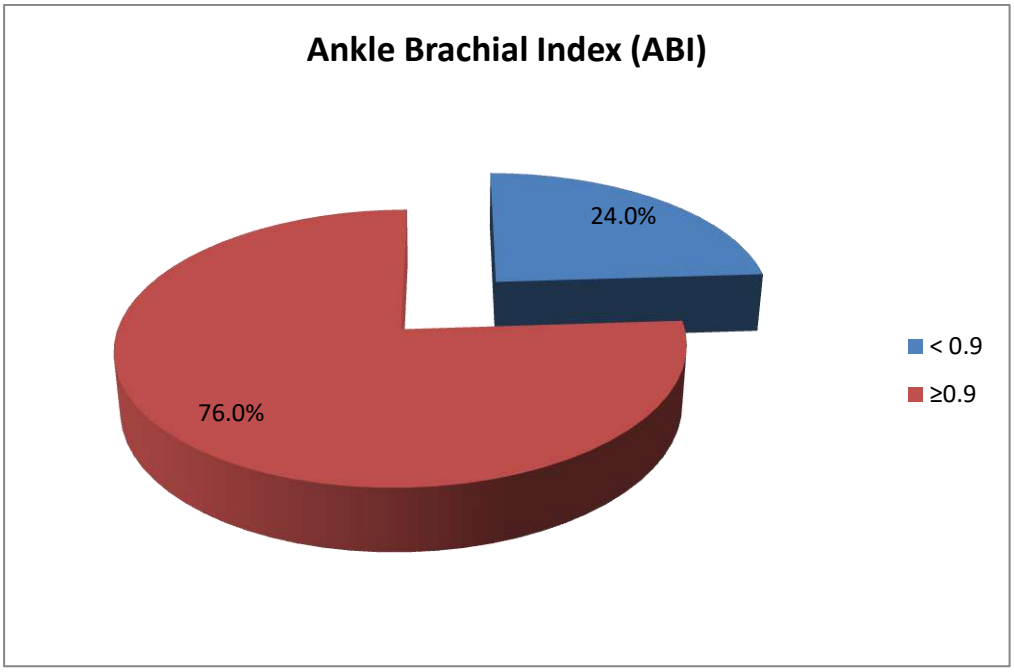
This figure shows that Vibration perception threshold was >25 in 71.2% (89), 20-25 in 12% (15), <15 in 8.8% (11) and 15-20 in 8% (10) participants.

Table 12: Distribution of study population based on Ankle Brachial Index (ABI) of study participants

Ankle Brachial Index (ABI)	No. of cases	Percentage
< 0.9	30	24.0%
≥0.9	95	76.0%
Total	125	100.0%

24% (30) participants had Ankle brachial index <0.9 and 76% (95) participants had Ankle brachial index ≥0.9.

Figure 11: Percentage wise distribution of study population based on Ankle Brachial Index (ABI)



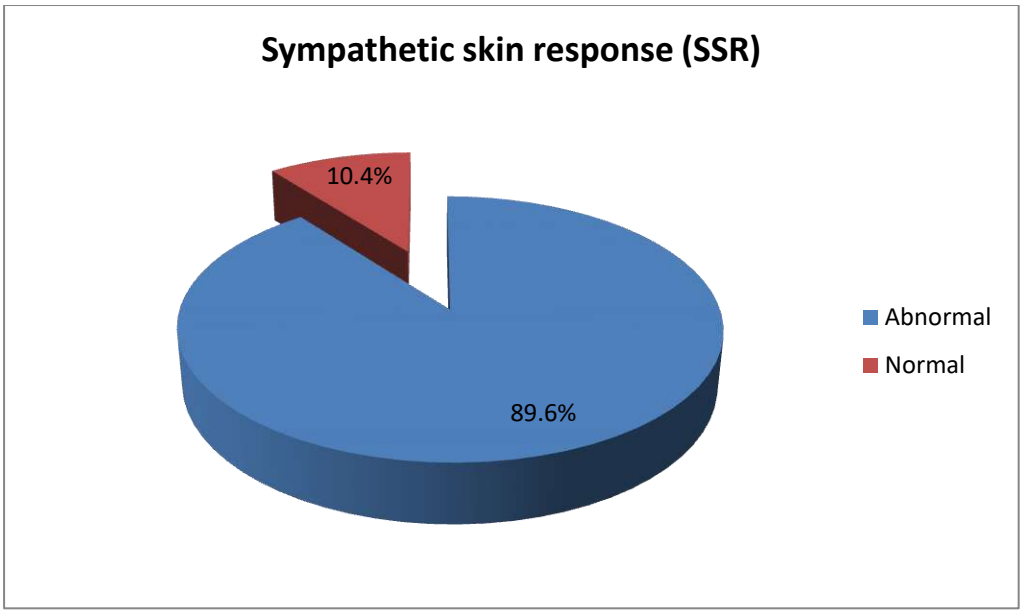
This figure shows that 24% (30) participants had Ankle brachial index <0.9 and 76% (95) participants had Ankle brachial index ≥0.9.

Table 13: Distribution of study population based on Sympathetic skin response (SSR) of study participants

Sympathetic skin response (SSR)	No. of cases	Percentage
Normal	13	10.4%
Abnormal	112	89.6%

89.6% (112) participants had abnormal Sympathetic skin response (SSR).

Figure 12: Percentage wise distribution of study population based on Sympathetic skin response (SSR)



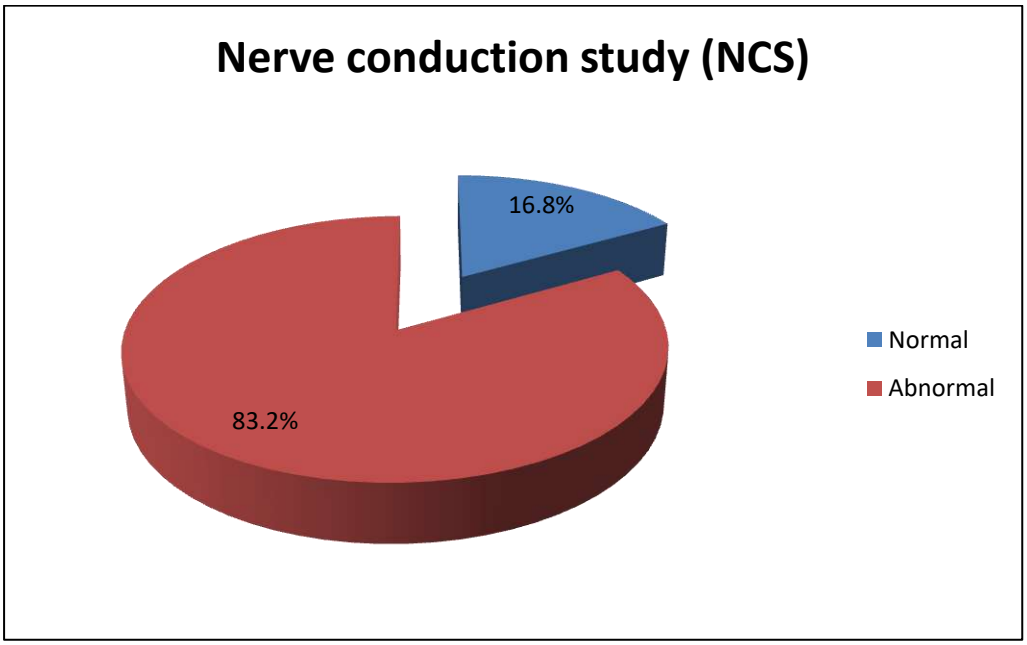
This figure shows that 89.6% (112) participants had abnormal Sympathetic skin response (SSR).

Table 14: Distribution of study population based on Nerve conduction study (NCS) of study participants

Nerve conduction study (NCS)	No. of cases	Percentage
Normal	21	16.8%
Abnormal	104	83.2%
Total	125	100.0%

83.2% (104) participants had abnormal Nerve conduction study (NCS).

Figure 13: Percentage wise distribution of study population based on Nerve conduction study (NCS)



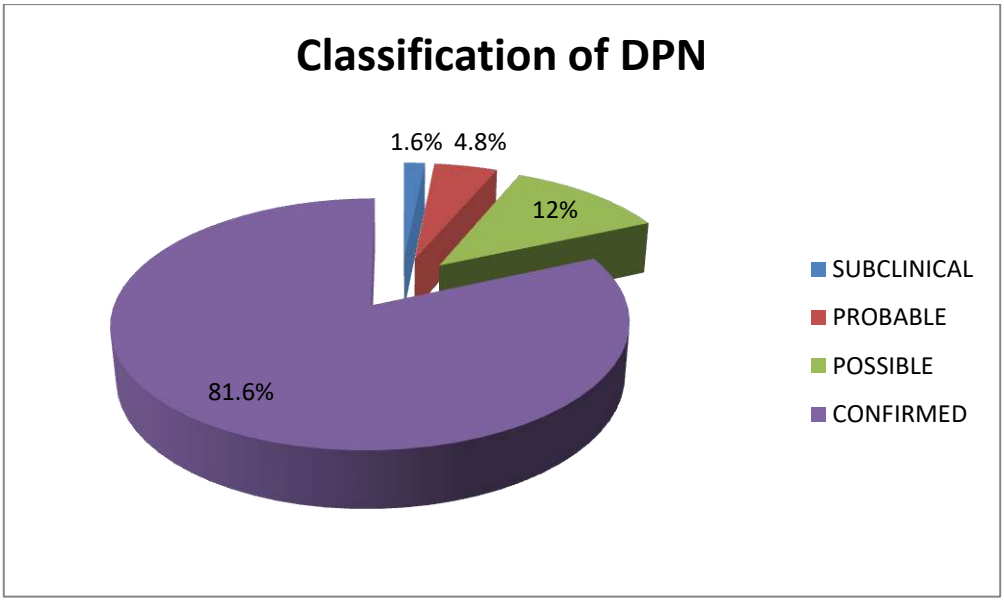
This figure shows that 83.2% (104) participants had abnormal Nerve conduction study (NCS).

Table 15: Distribution of study population based on classification of DPN

Classification of DPN	No. of cases	Percentage
PROBABLE	6	4.8%
POSSIBLE	15	12.0%
CONFIRMED	102	81.6%
SUBCLINICAL	2	1.6%
Total	125	100.0%

81.6% (102) participants had confirmed DSPN, 12% (15) participants had possible DSPN and 4.8% (6) participants had probable DSPN and 1.6% (2) participants had subclinical DSPN.

Figure 14: Percentage wise distribution of study population based on classification of Diabetic peripheral neuropathy (DPN)



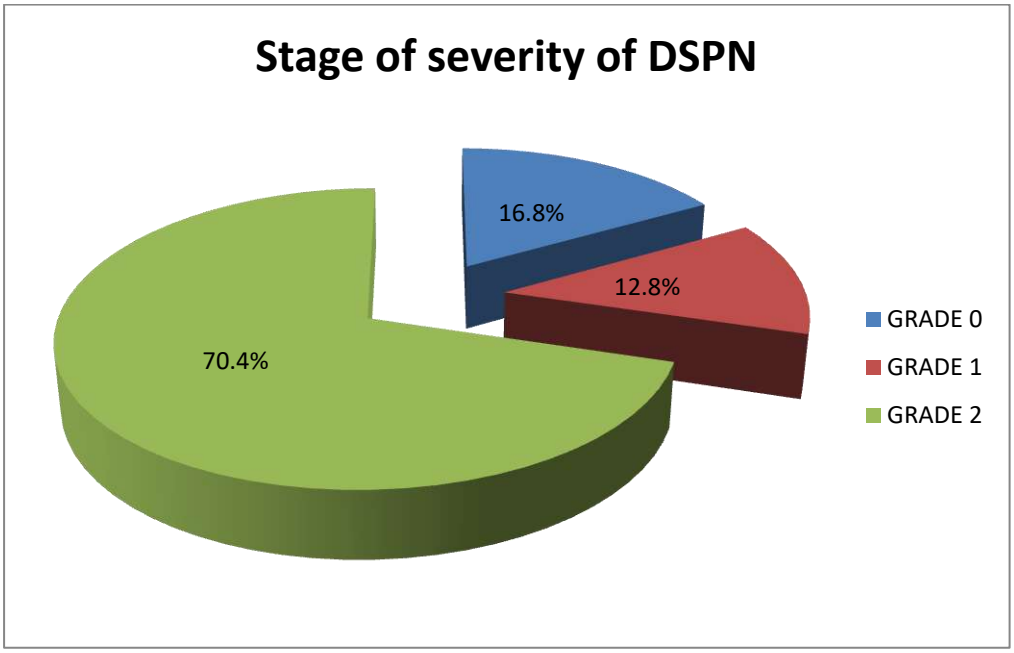
This figure shows that 81.6% (102) participants had confirmed DSPN, 12% (15) participants had possible DSPN and 4.8% (6) participants had probable DSPN. 1.6% participants had subclinical DSPN.

Table 16: Distribution of study population based on Stage of severity of DSPN.

Stage of severity of DSPN	No. of cases	Percentage
GRADE 0	21	16.8%
GRADE 1	16	12.8%
GRADE 2	88	70.4%
Total	125	100.0%

70.4% (88) participants had Grade 2 severity, 16.8% (21) participants had Grade 0 severity and 12.8% (16) participants had Grade 1 severity

Figure 15: Percentage wise distribution of study population based on Stage of severity of DSPN



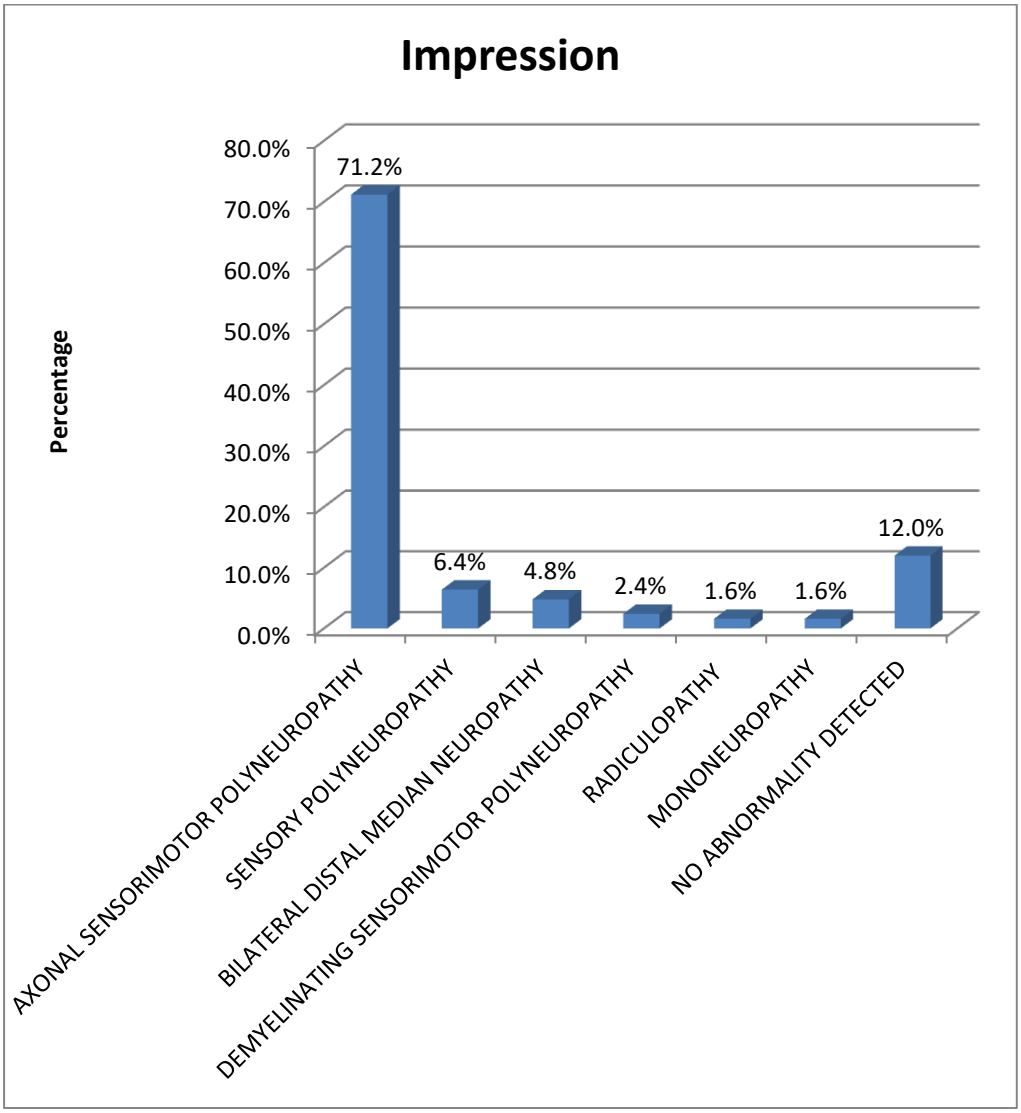
This figure shows that 70.4% (88) participants had Grade 2 severity, 16.8% (21) participants had Grade 0 severity and 12.8% (16) participants had Grade 1 severity.

Table 17: Distribution of study population based on Impression of Nerve conduction study

IMPRESSION	No. of cases	Percentage
AXONAL SENSORIMOTOR POLYNEUROPATHY	89	71.2%
BILATERAL DISTAL MEDIAN NEUROPATHY	6	4.8%
RADICULOPATHY (C8-T1, B/L L4-L5)	2	1.6%
DEMYELINATING SENSORIMOTOR POLYNEUROPATHY	3	2.4%
NO ABNORMALITY DETECTED	15	12.0%
MONONEUROPATHY (Right common peroneal neuropathy)	2	1.6%
SENSORY POLYNEUROPATHY	8	6.4%
Total	125	100.0%

71.2% (89) participants had Axonal sensorimotor polyneuropathy, 6.4% (8) participants had Sensory polyneuropathy, 4.8% (6) participants had Bilateral distal median neuropathy, 2.4% (3) participants had Demyelinating sensorimotor polyneuropathy, 1.6% (2) participants had Radiculopathy and Mononeuropathy each.

Figure 16: Percentage wise distribution of study population based on Impression of Nerve conduction study



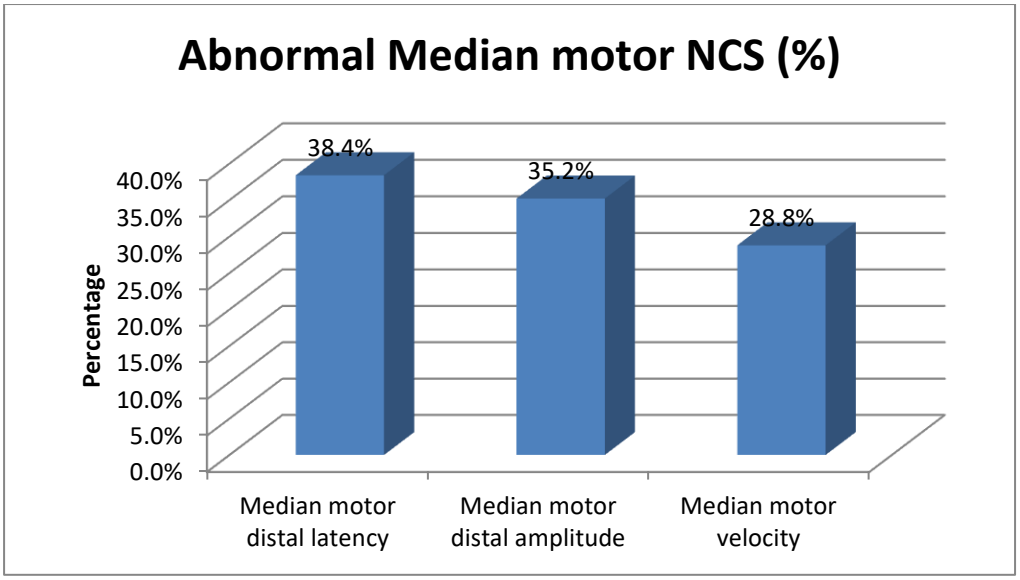
This figure shows that 71.2% (89) participants had Axonal sensorimotor polyneuropathy, 6.4% (8) participants had Sensory polyneuropathy, 4.8% (6) had Bilateral distal median neuropathy, 2.4% (3) participants had Demyelinating sensorimotor polyneuropathy, 1.6% (2) participants had Radiculopathy and Mononeuropathy each.

Table 18: Distribution of study population based on abnormal Median motor nerve conduction study parameters

	No. of cases	Percentage
Median motor distal latency	48	38.4%
Median motor distal amplitude	44	35.2%
Median motor velocity	36	28.8%

Median motor distal latency was abnormal in 38.4% (48) participants, Median motor distal amplitude was abnormal in 35.2% (44) participants and Median motor velocity was abnormal in 28.8% (36) participants.

Figure 17: Percentage wise distribution of study population based on abnormal Median motor nerve conduction study parameters



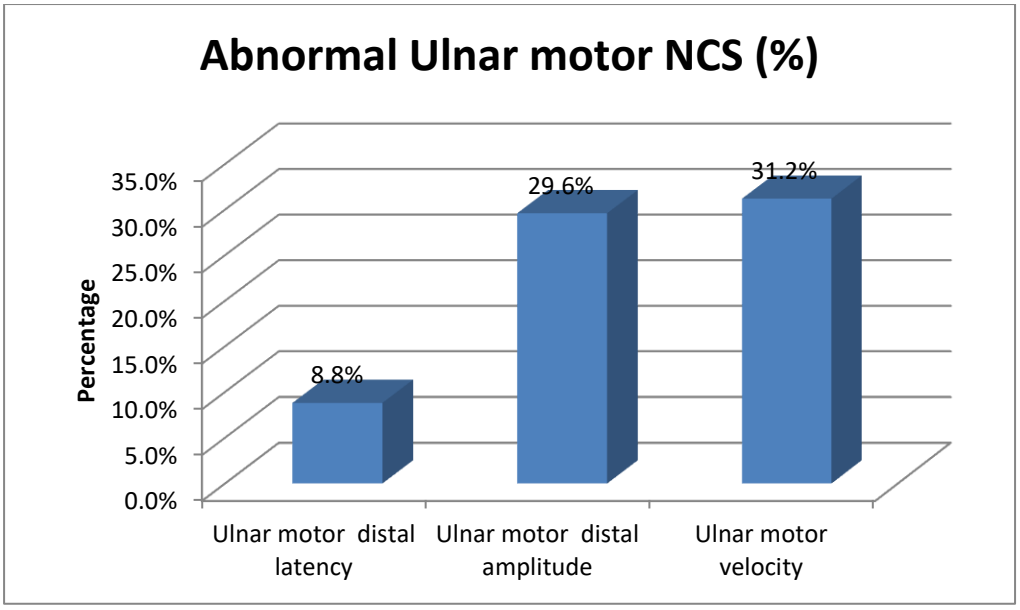
This figure shows that Median motor distal latency was abnormal in 38.4% (48) participants, Median motor distal amplitude was abnormal in 35.2% (44) participants and Median motor velocity was abnormal in 28.8% (36) participants.

Table 19: Distribution of study population based on abnormal Ulnar motor nerve conduction study parameters

	No. of cases	Percentage
Ulnar motor distal latency	11	8.8%
Ulnar motor distal amplitude	37	29.6%
Ulnar motor velocity	39	31.2%

Ulnar motor distal latency was abnormal in 8.8 % (11) participants, Ulnar motor distal amplitude was abnormal in 29.6 % (37) participants and Ulnar motor velocity was abnormal in 31.2 % (39) participants.

Figure 18: Percentage wise distribution of study population based on abnormal Ulnar motor nerve conduction study parameters



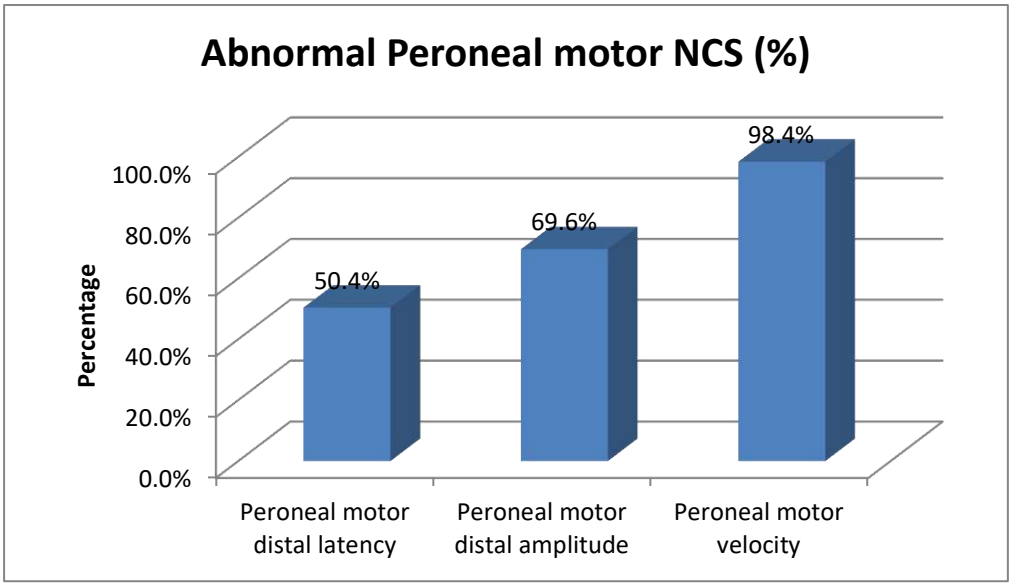
This figure shows that Ulnar motor distal latency was abnormal in 8.8 % (11) participants, Ulnar motor distal amplitude was abnormal in 29.6 % (37) participants and Ulnar motor velocity was abnormal in 31.2 % (39) participants.

Table 20: Distribution of study population based on abnormal Peroneal motor nerve conduction study parameters

	No. of cases	Percentage
Peroneal motor distal latency	63	50.4%
Peroneal motor distal amplitude	87	69.6%
Peroneal motor velocity	123	98.4%

Peroneal motor distal latency was abnormal in 50.4% (63) participants, Peroneal motor distal amplitude was abnormal in 69.6% (87) participants and Peroneal motor velocity was abnormal in 98.4% (123) participants.

Figure 19: Percentage wise distribution of study population based on abnormal Peroneal motor nerve conduction study parameters



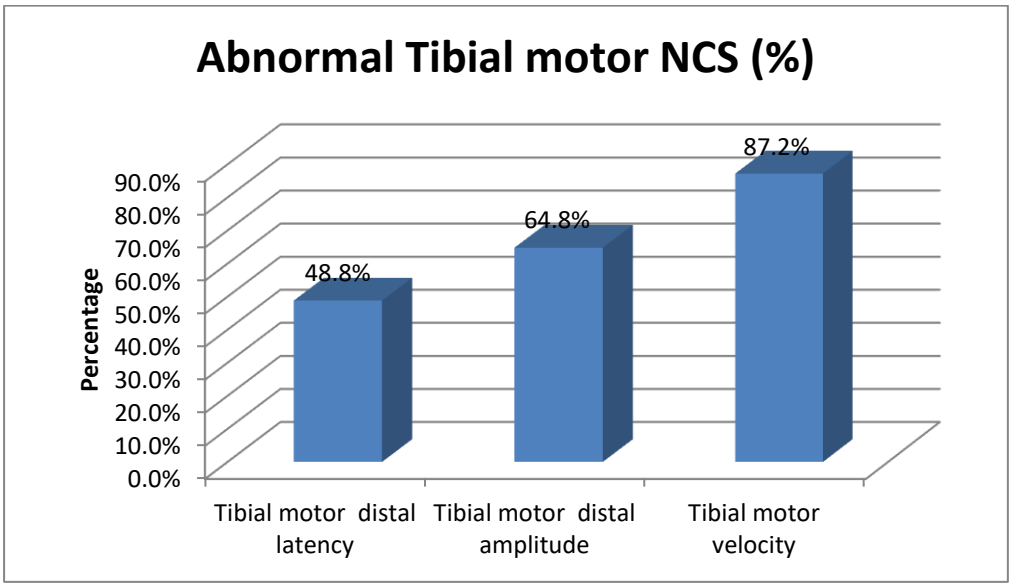
This figure shows that Peroneal motor distal latency was abnormal in 50.4% (63) participants, Peroneal motor distal amplitude was abnormal in 69.6% (87) participants and Peroneal motor velocity was abnormal in 98.4% (123) participants.

Table 21: Distribution of study population based on abnormal Tibial motor nerve conduction study parameters

	No. of cases	Percentage
Tibial motor distal latency	61	48.8%
Tibial motor distal amplitude	81	64.8%
Tibial motor velocity	109	87.2%

Tibial motor distal latency was abnormal in 48.8% (61) participants, Tibial motor distal amplitude was abnormal in 64.8 % (81) participants and Tibial motor velocity was abnormal in 87.2 % (109) participants.

Figure 20: Percentage wise distribution of study population based on abnormal Tibial motor nerve conduction study parameters



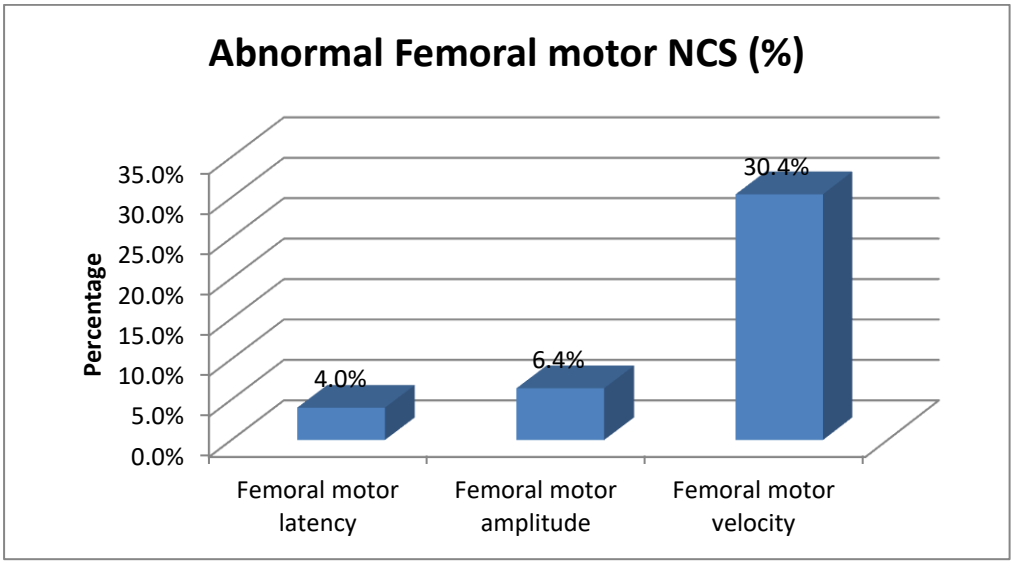
This figure shows that Tibial motor distal latency was abnormal in 48.8% (61) participants, Tibial motor distal amplitude was abnormal in 64.8 % (81) participants and Tibial motor velocity was abnormal in 87.2 % (109) participants.

Table 22: Distribution of study population based on abnormal Femoral motor nerve conduction study parameters

	No. of cases	Percentage
Femoral motor latency	5	4.0%
Femoral motor amplitude	8	6.4%
Femoral motor velocity	38	30.4%

Femoral motor latency was abnormal in 4% (5) participants, Femoral motor amplitude was abnormal in 6.4 % (8) participants and Femoral motor velocity was abnormal in 30.4 % (38) participants.

Figure 21: Percentage wise distribution of study population based on abnormal Femoral motor nerve conduction study parameters



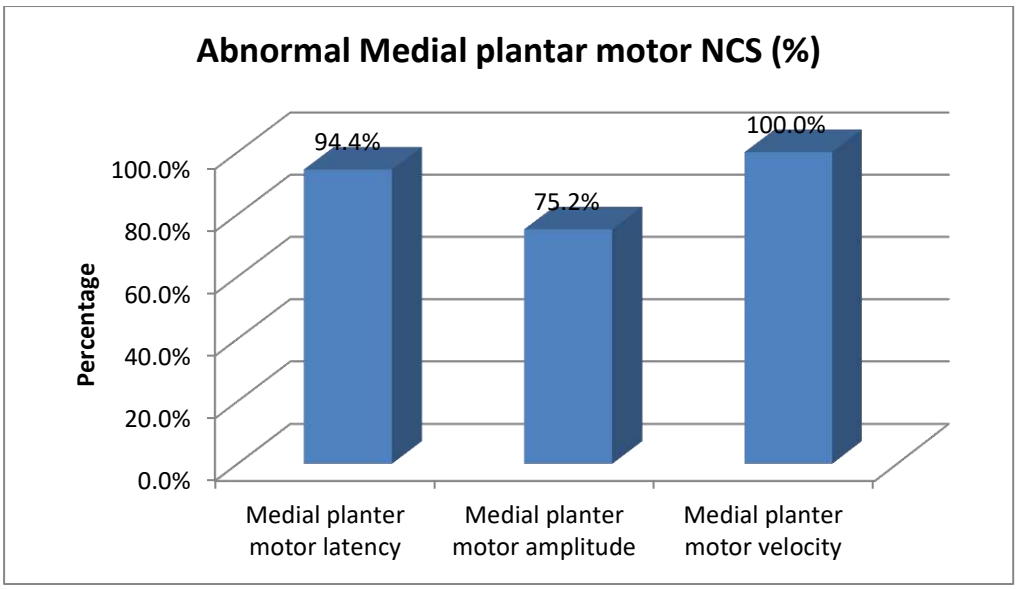
This figure shows that Femoral motor latency was abnormal in 4% (5) participants, Femoral motor amplitude was abnormal in 6.4 % (8) participants and Femoral motor velocity was abnormal in 30.4 % (38) participants.

Table 23: Distribution of study population based on abnormal Medial plantar motor nerve conduction study parameters

	No. of cases	Percentage
Medial planter motor latency	118	94.4%
Medial planter motor amplitude	94	75.2%
Medial planter motor velocity	125	100.0%

Medial plantar motor latency was abnormal in 94.4% (118) participants, Medial plantar motor amplitude was abnormal in 75.2 % (94) participants and Medial plantar motor velocity was abnormal in 100 % (125) participants.

Figure 22: Percentage wise distribution of study population based on abnormal Medial plantar motor nerve conduction study parameters



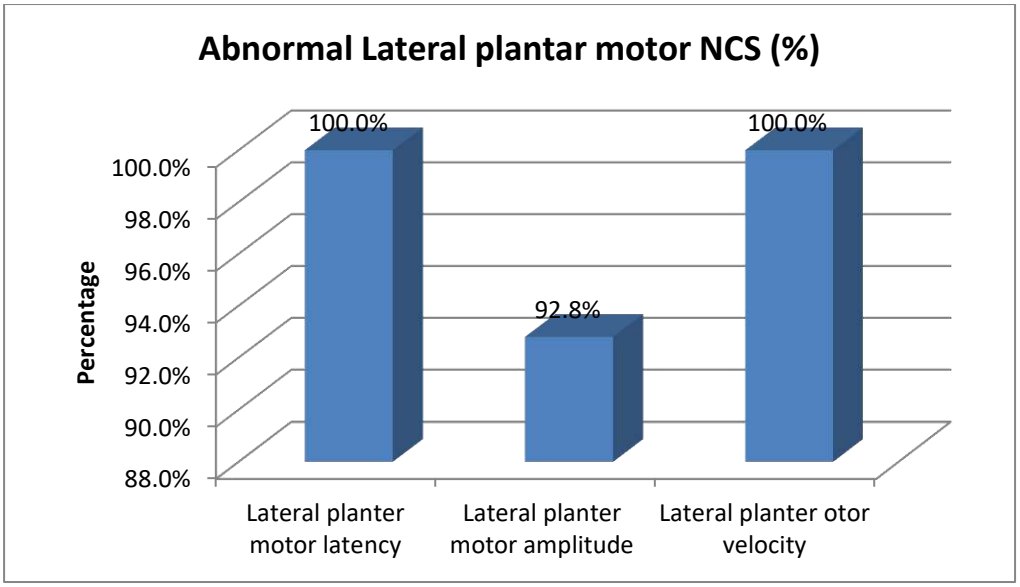
This figure shows that Medial plantar motor latency was abnormal in 94.4% (118) participants, Medial plantar motor amplitude was abnormal in 75.2 % (94) participants and Medial plantar motor velocity was abnormal in 100.% (125) participants.

Table 24: Distribution of study population based on abnormal Lateral plantar motor nerve conduction study parameters

	No. of cases	Percentage
Lateral planter motor latency	125	100.0%
Lateral planter motor amplitude	116	92.8%
Lateral planter motor velocity	125	100.0%

Lateral plantar motor latency was abnormal in 100% (125) participants, Lateral plantar motor amplitude was abnormal in 92.8 % (116) participants and Lateral plantar motor velocity was abnormal in 100 % (125) participants.

Figure 23: Percentage wise distribution of study population based on abnormal Lateral plantar motor nerve conduction study parameters



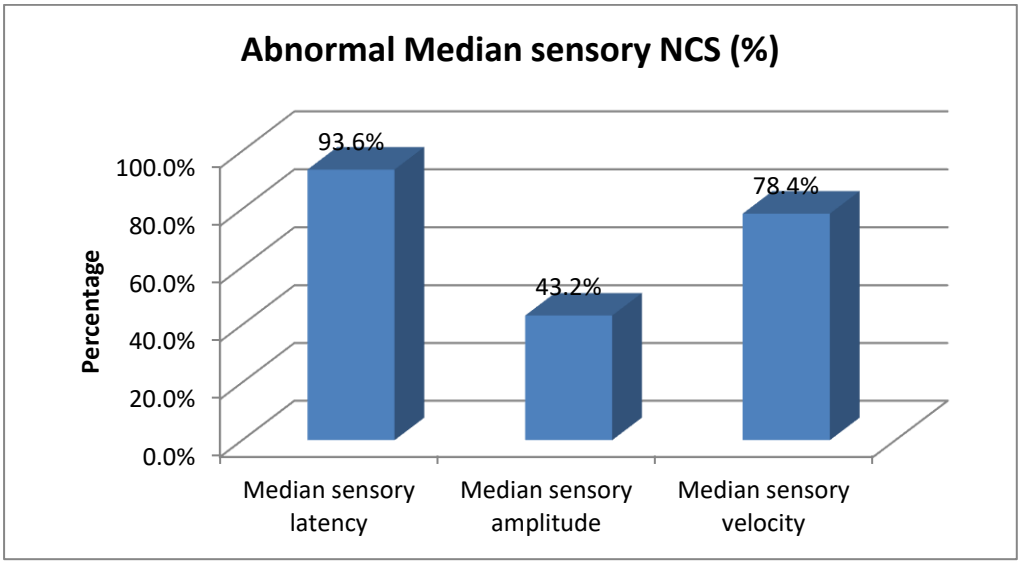
This figure shows that Lateral plantar motor latency was abnormal in 100% (125) participants, Lateral plantar motor amplitude was abnormal in 92.8 % (116) participants and Lateral plantar motor velocity was abnormal in 100 % (125) participants.

Table 25: Distribution of study population based on abnormal Median sensory nerve conduction study parameters

	No. of cases	Percentage
Median sensory latency	117	93.6%
Median sensory amplitude	54	43.2%
Median sensory velocity	98	78.4%

Median sensory latency was abnormal in 93.6% (117) participants, Median sensory amplitude was abnormal in 43.2% (54) participants and Median sensory velocity was abnormal in 78.4 % (98) participants.

Figure 24: Percentage wise distribution of study population based on abnormal Median sensory nerve conduction study parameters



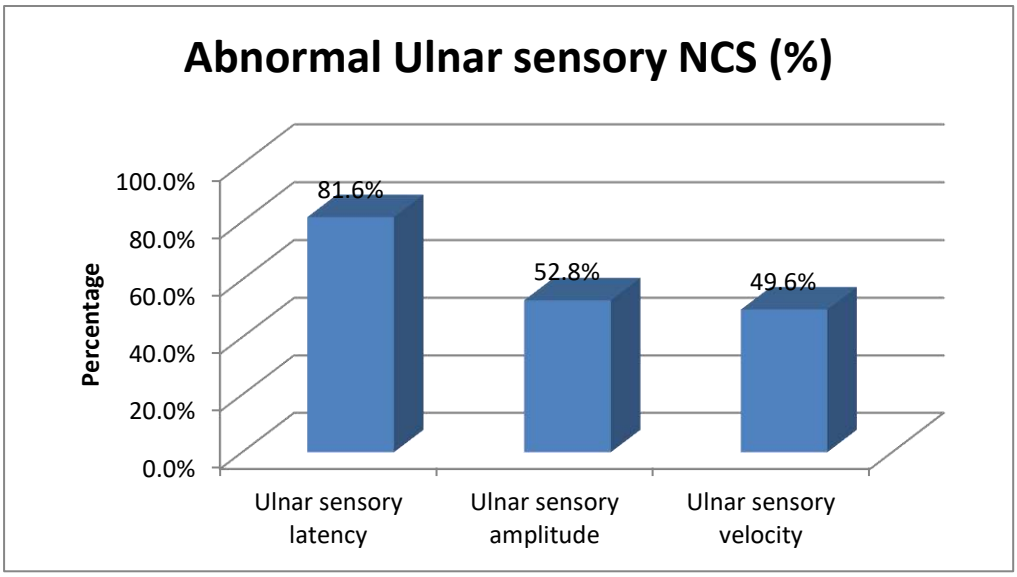
This figure shows that Median sensory latency was abnormal in 93.6% (117) participants, Median sensory amplitude was abnormal in 43.2% (54) participants and Median sensory velocity was abnormal in 78.4 % (98) participants.

Table 26: Distribution of study population based on abnormal Ulnar sensory nerve conduction study parameters

	No. of cases	Percentage
Ulnar sensory latency	102	81.6%
Ulnar sensory amplitude	66	52.8%
Ulnar sensory velocity	62	49.6%

Ulnar sensory latency was abnormal in 81.6 % (102) participants, Ulnar sensory amplitude was abnormal in 52.8% (66) participants and Ulnar sensory velocity was abnormal in 49.6% (62) participants.

Figure 25: Percentage wise distribution of study population based on abnormal Ulnar sensory nerve conduction study parameters



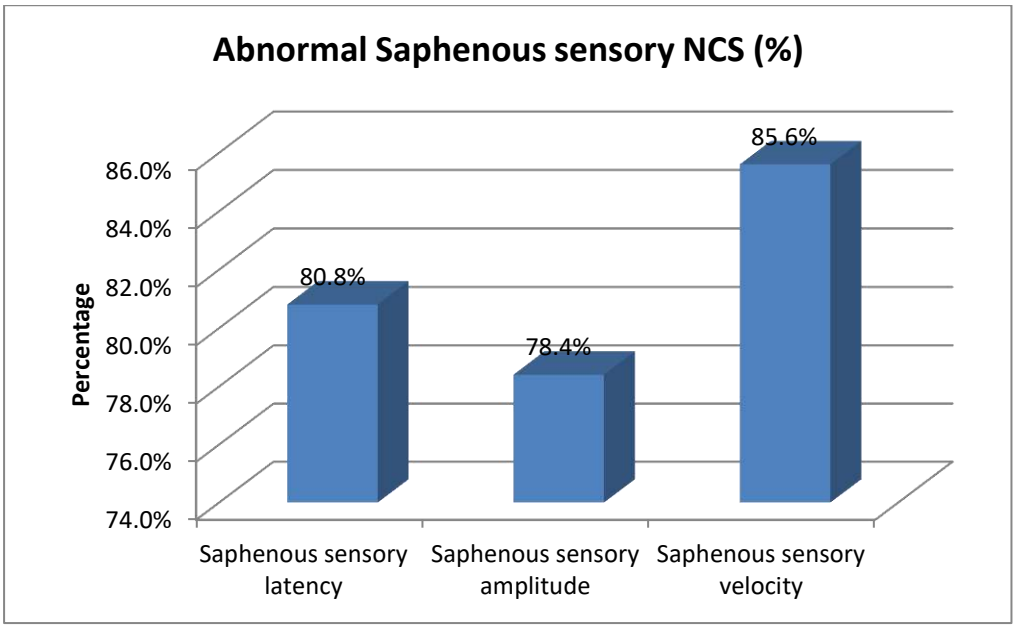
This figure shows that Ulnar sensory latency was abnormal in 81.6 % (102) participants, Ulnar sensory amplitude was abnormal in 52.8% (66) participants and Ulnar sensory velocity was abnormal in 49.6% (62) participants.

Table 27: Distribution of study population based on abnormal Saphenous sensory nerve conduction study parameters

	No. of cases	Percentage
Saphenous sensory latency	101	80.8%
Saphenous sensory amplitude	98	78.4%
Saphenous sensory velocity	107	85.6%

Saphenous sensory latency was abnormal in 80.8 % (101) participants, Saphenous sensory amplitude was abnormal in 78.4 % (98) participants and Saphenous sensory velocity was abnormal in 85.6 % (107) participants.

Figure 26: Percentage wise distribution of study population based on abnormal Saphenous sensory nerve conduction study parameters



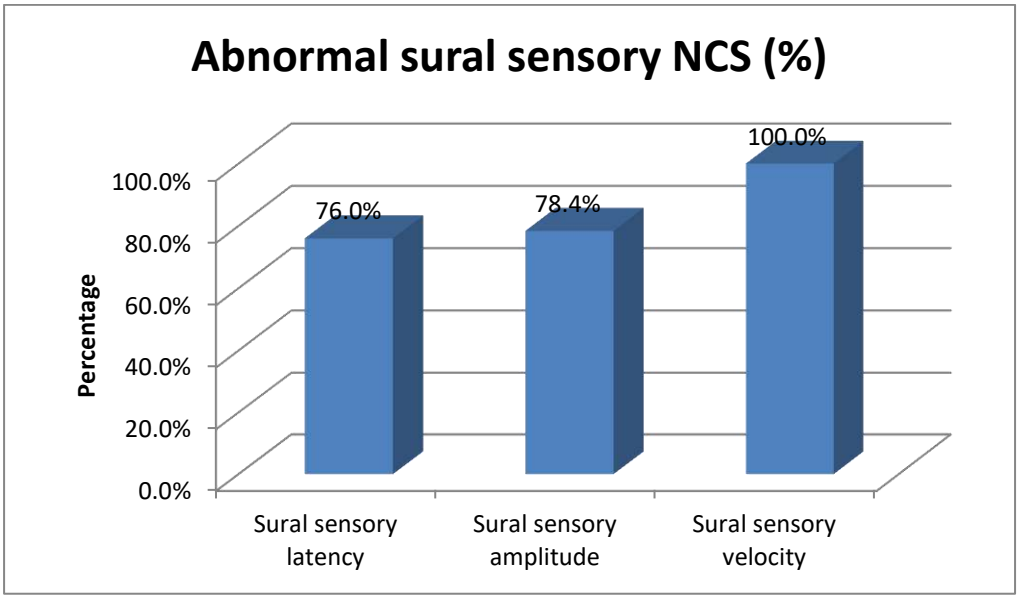
This figure shows that Saphenous sensory latency was abnormal in 80.8 % (101) participants, Saphenous sensory amplitude was abnormal in 78.4 % (98) participants and Saphenous sensory velocity was abnormal in 85.6 % (107) participants.

Table 28: Distribution of study population based on abnormal Sural sensory nerve conduction study parameters

	No. of cases	Percentage
Sural sensory latency	95	76.0%
Sural sensory amplitude	98	78.4%
Sural sensory velocity	125	100.0%

Sural sensory latency was abnormal in 76 % (95) participants, Sural sensory amplitude was abnormal in 78.4 % (98) participants and Sural sensory velocity was abnormal in 100 % (125) participants.

Figure 27: Percentage wise distribution of study population based on abnormal Sural sensory nerve conduction study parameters



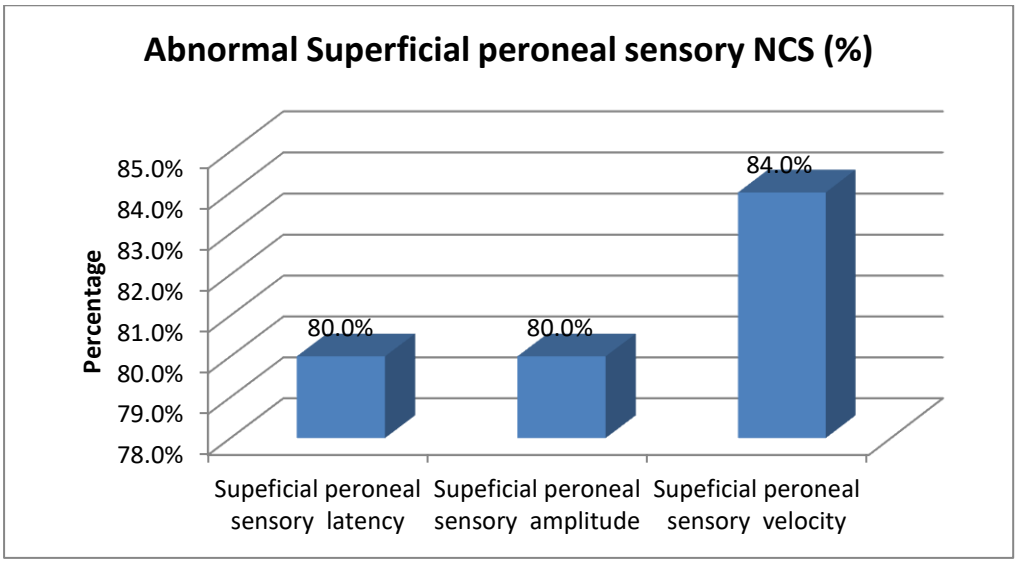
This figure shows that Sural sensory latency was abnormal in 76 % (95) participants, Sural sensory amplitude was abnormal in 78.4 % (98) participants and Sural sensory velocity was abnormal in 100 % (125) participants.

Table 29: Distribution of study population based on abnormal Supeficial peroneal sensory nerve conduction study parameters

	No. of cases	Percentage
Supeficial peroneal sensory latency	100	80.0%
Supeficial peroneal sensory amplitude	100	80.0%
Supeficial peroneal sensory velocity	105	84.0%

Supeficial peroneal sensory latency was abnormal in 80 % (100) participants, Supeficial peroneal sensory amplitude was abnormal in 80 % (100) participants and Supeficial peroneal sensory velocity was abnormal in 84% (105) participants.

Figure 28: Percentage wise distribution of study population based on abnormal Superficial peroneal sensory nerve conduction study parameters



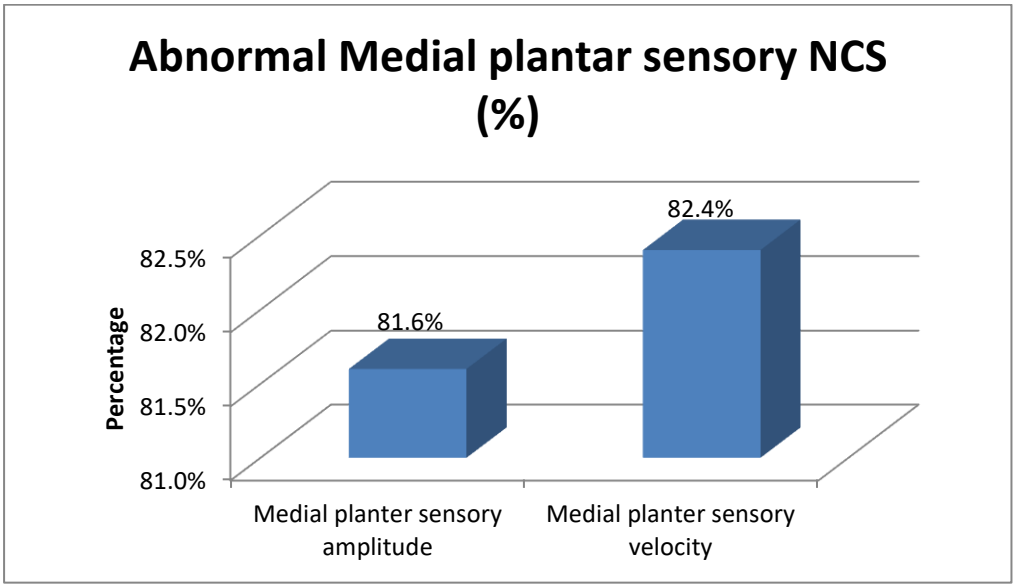
This figure shows that Supeficial peroneal sensory latency was abnormal in 80 % (100) participants, Supeficial peroneal sensory amplitude was abnormal in 80 % (100) participants and Supeficial peroneal sensory velocity was abnormal in 84% (105) participants.

Table 30: Distribution of study population based on abnormal Medial planter sensory nerve conduction study parameters

	No. of cases	Percentage
Medial planter sensory amplitude	102	81.6%
Medial planter sensory velocity	103	82.4%

Medial planter sensory amplitude was abnormal in 81.6 % (102) participants and Medial planter sensory velocity was abnormal in 82.4 % (103) participants.

Figure 29: Percentage wise distribution of study population based on abnormal Medial planter sensory nerve conduction study parameters



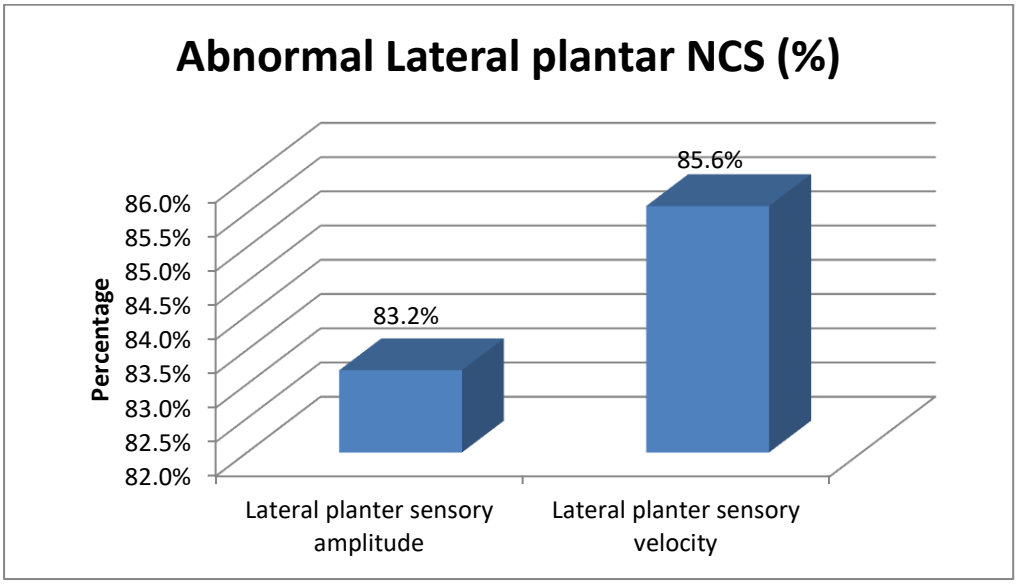
This figure shows that Medial planter sensory amplitude was abnormal in 81.6 % (102) participants and Medial planter sensory velocity was abnormal in 82.4 % (103) participants.

Table 31: Distribution of study population based on abnormal Lateral planter sensory nerve conduction study parameters

	No. of cases	Percentage
Lateral planter sensory amplitude	104	83.2%
Lateral planter sensory velocity	107	85.6%

Lateral planter sensory amplitude was abnormal in 83.2% (104) participants and Lateral planter sensory velocity was abnormal in 85.6% (107) participants.

Figure 30: Percentage wise distribution of study population based on abnormal Lateral planter sensory nerve conduction study parameters



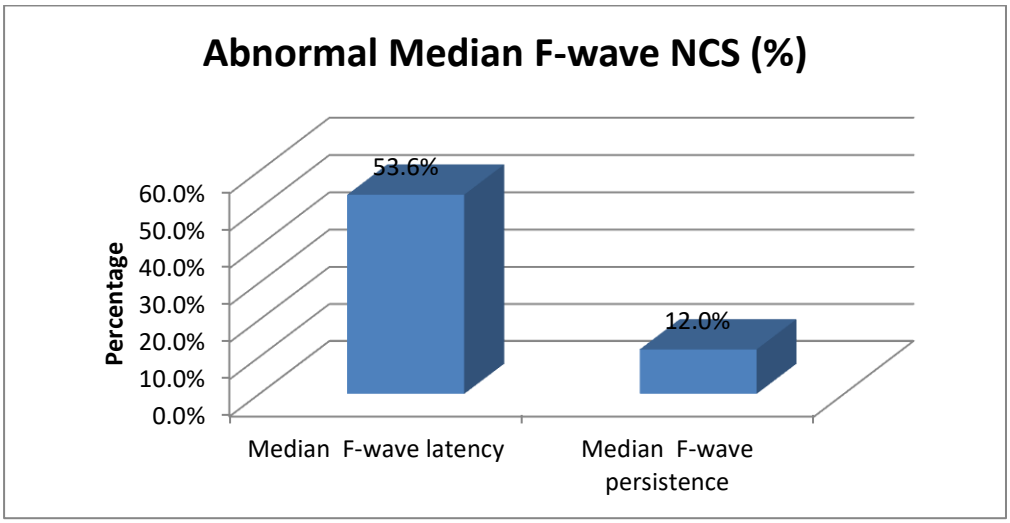
This figure shows that Lateral planter sensory amplitude was abnormal in 83.2% (104) participants and Lateral planter sensory velocity was abnormal in 85.6% (107) participants.

Table 32: Distribution of study population based on abnormal Median F-wave nerve conduction study parameters

	No. of cases	Percentage
Median F-wave latency	67	53.6%
Median F-wave persistence	15	12.0%

Median F-wave latency was abnormal in 53.6 % (67) participants and Median F-wave persistance was abnormal in 12 % (15) participants.

Figure 31: Percentage wise distribution of study population based on abnormal Median F-wave nerve conduction study parameters



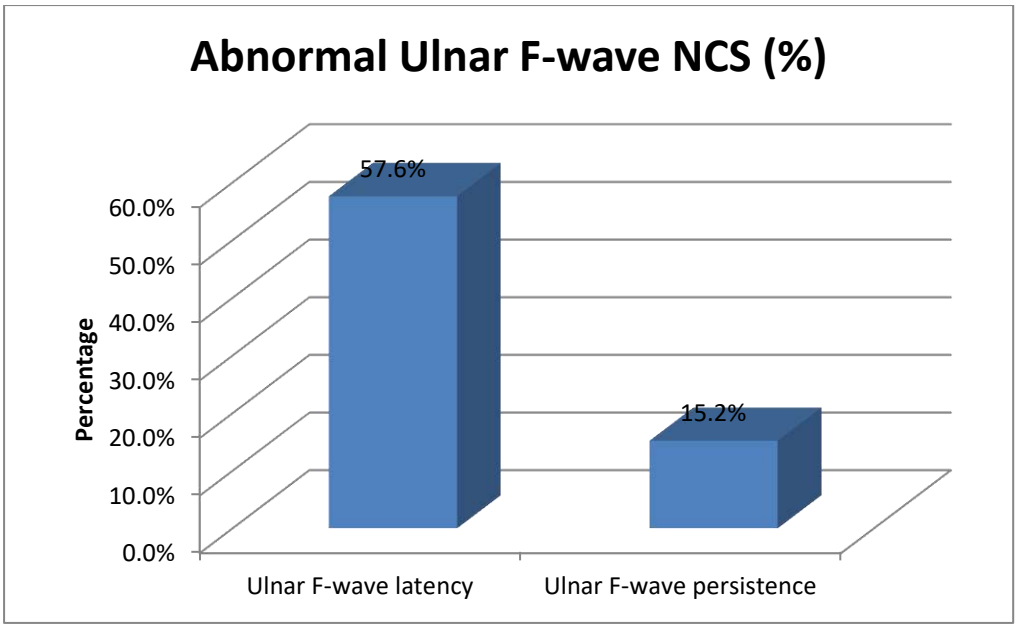
This figure shows that Median F-wave latency was abnormal in 53.6 % (67) participants and Median F-wave persistance was abnormal in 12 % (15) participants.

Table 33: Distribution of study population based on abnormal Ulnar F-wave nerve conduction study parameters

	No. of cases	Percentage
Ulnar F-wave latency	72	57.6%
Ulnar F-wave persistence	19	15.2%

Ulnar F-wave latency was abnormal in 57.6 % (72) participants and Ulnar F-wave persistance was abnormal in 15.2 % (19) participants.

Figure 32: Percentage wise distribution of study population based on abnormal Ulnar F-wave nerve conduction study parameters



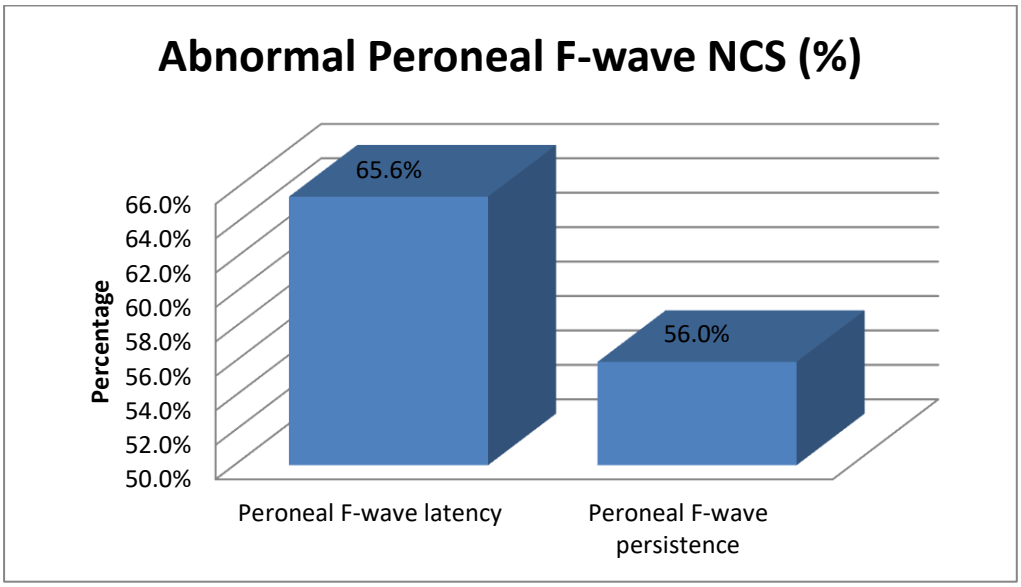
This figure shows that Ulnar F-wave latency was abnormal in 57.6 % (72) participants and Ulnar F-wave persistance was abnormal in 15.2 % (19) participants.

Table 34: Distribution of study population based on abnormal Peroneal F-wave nerve conduction study parameters

	No. of cases	Percentage
Peroneal F-wave latency	82	65.6%
Peroneal F-wave persistence	70	56.0%

Peroneal F-wave latency was abnormal in 65.6 % (82) participants and Peroneal F-wave persistance was abnormal in 56 % (70) participants.

Figure 33: Percentage wise distribution of study population based on abnormal Peroneal F-wave nerve conduction study parameters



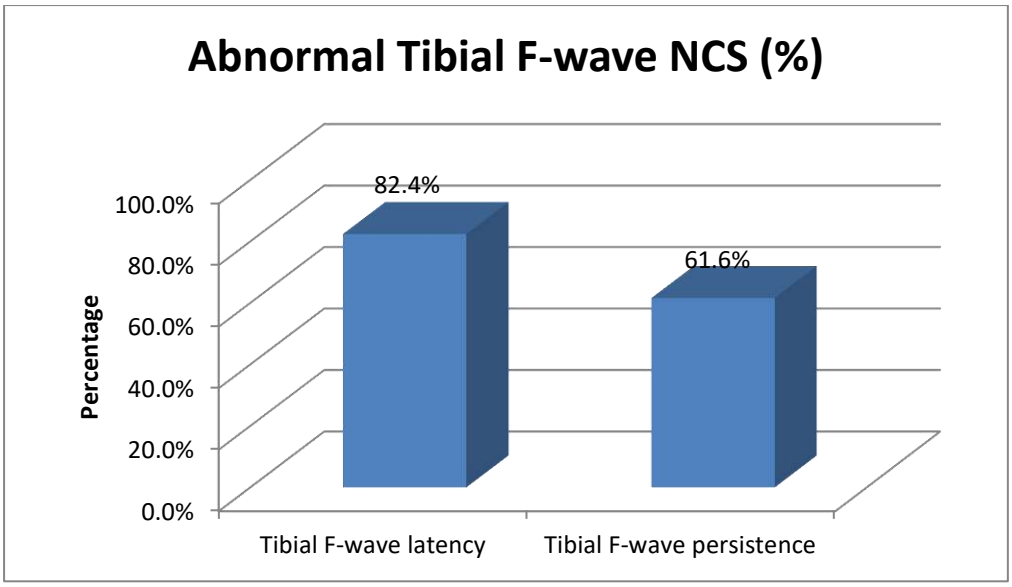
This figure shows that Peroneal F-wave latency was abnormal in 65.6 % (82) participants and Peroneal F-wave persistance was abnormal in 56 % (70) participants.

Table 35: Distribution of study population based on abnormal Tibial F-wave nerve conduction study parameters

	No. of cases	Percentage
Tibial F-wave latency	103	82.4%
Tibial F-wave persistence	77	61.6%

Tibial F-wave latency was abnormal in 82.4 % (103) participants and Tibial F-wave persistance was abnormal in 61.6 % (77) participants.

Figure 34: Percentage wise distribution of study population based on abnormal Tibial F-wave nerve conduction study parameters



This figure shows that Tibial F-wave latency was abnormal in 82.4 % (103) participants and Tibial F-wave persistance was abnormal in 61.6 % (77) participants.

Table 36: Correlation of age group of study participants with clinical and neuro-electrophysiological parameters

		Age (years) group								Total	chi-square value	p-value
		< 50		51-60		61-70		> 70				
MNSI-A score	Negative	9	40.9%	6	15.8%	3	7.5%	6	24.0%	24	10.869	0.012
	Positive	13	59.1%	32	84.2%	37	92.5%	19	76.0%	101		
MNSI-B score	Negative	9	40.9%	4	10.5%	5	12.5%	0	0.0%	18	17.328	0.001
	Positive	13	59.1%	34	89.5%	35	87.5%	25	100.0%	107		
NCS	Normal	8	36.4%	6	15.8%	5	12.5%	2	8.0%	21	7.966	0.047
	Abnormal	14	63.6%	32	84.2%	35	87.5%	23	92.0%	104		
Classification of DPN	SUBCLINICAL	2	9.1%	0	0.0%	0	0.0%	0	0.0%	2	21.513	0.011
	PROBABLE	2	9.1%	1	2.6%	1	2.5%	2	8.0%	6		
	POSSIBLE	6	27.3%	5	13.2%	4	10.0%	0	0.0%	15		
	CONFIRMED	12	54.5%	32	84.2%	35	87.5%	23	92.0%	104		
Stage of severity	GRADE 0	8	36.4%	6	15.8%	5	12.5%	2	8.0%	21	10.981	0.089
	GRADE 1	6	27.3%	4	10.5%	0	0.0%	6	24.0%	16		
	GRADE 2	8	36.4%	28	73.7%	35	87.5%	17	68.0%	88		

ABI	< 0.9	4	18.2%	7	18.4%	11	27.5%	8	32.0%	30	5.477	0.484
	≥ 0.9	18	81.8%	31	81.6%	29	72.5%	17	68.0%	95		
VPT	< 15	6	27.3%	4	10.5%	1	2.5%	0	0.0%	11	28.575	0.001
	15-20	4	18.2%	3	7.9%	3	7.5%	0	0.0%	10		
	20-25	5	22.7%	5	13.2%	4	10.0%	1	4.0%	15		
	>25	7	31.8%	26	68.4%	32	80.0%	24	96.0%	89		
SSR	Normal	4	18.2%	4	10.5%	4	10.0%	1	4.0%	13	2.536	0.469
	Abnormal	18	81.8%	34	89.5%	36	90.0%	24	96.0%	112		
UACR	< 30	8	36.4%	8	21.1%	4	10.0%	2	8.0%	22	19.783	0.003
	30-300	7	31.8%	10	26.3%	13	32.5%	1	4.0%	31		
	> 300	7	31.8%	20	52.6%	23	57.5%	22	88.0%	72		
Fundoscopy findings	No DR	16	72.7%	22	57.9%	15	37.5%	7	28.0%	60	15.951	0.194
	Mild NPDR	3	13.6%	6	15.8%	8	20.0%	4	16.0%	21		
	Mod NPDR	2	9.1%	5	13.2%	7	17.5%	7	28.0%	21		
	Severe NPDR	0	0.0%	1	2.6%	4	10.0%	3	12.0%	8		
	PDR	1	4.5%	4	10.5%	6	15.0%	4	16.0%	15		
Total		22	100.0%	38	100.0%	40	100.0%	25	100.0%	125		

Age group of study participants was significantly correlated with MNSI-A score, MNSI-B score, NCS, Classification of DPN, VPT, UACR. Age group was not significantly correlated with Stage of severity, ABI, SSR and Fundoscopy findings.

Table 37: Correlation of Gender of study participants with other clinical and neuro-electrophysiological parameters

		Gender				Total	chi-square value	p-value
		F		M				
MNSI-A score	Negative	4	10.3%	20	23.3%	24	2.923	0.087
	Positive	35	89.7%	66	76.7%	101		
MNSI-B score	Negative	9	23.1%	9	10.5%	18	3.462	0.096
	Positive	30	76.9%	77	89.5%	107		
NCS	Normal	11	28.2%	10	11.6%	21	5.275	0.037
	Abnormal	28	71.8%	76	88.4%	104		
Classification of DPN	SUBCLINICAL	0	0.0%	2	2.3%	2	5.986	0.112
	POSSIBLE	8	20.5%	7	8.1%	15		
	PROBABLE	3	7.7%	3	3.5%	6		
	CONFIRMED	28	71.8%	74	86.0%	102		
Stage of severity	GRADE 0	11	28.2%	10	11.6%	27	9.04	0.011
	GRADE 1	1	2.6%	15	17.4%	13		
	GRADE 2	27	69.2%	61	70.9%	1		
ABI	< 0.9	9	23.1%	21	24.4%	30	1.142	0.565
	> 0.9	30	76.9%	65	75.6%	95		

VPT	< 15	4	10.3%	7	8.1%	11	6.262	0.100
	15-20	6	15.4%	4	4.7%	10		
	20-25	2	5.1%	13	15.1%	15		
	>25	27	69.2%	62	72.1%	89		
SSR	Normal	8	20.5%	5	5.8%	13	6.221	0.023
	Abnormal	31	79.5%	81	94.2%	112		
UACR	< 30	8	20.5%	14	16.3%	22	5.020	0.081
	30-300	14	35.9%	17	19.8%	31		
	> 300	17	43.6%	55	64.0%	72		
Fundoscopy findings	No DR	23	59.0%	37	43.0%	60	5.068	0.280
	Mild NPDR	7	17.9%	14	16.3%	21		
	Mod NPDR	6	15.4%	15	17.4%	21		
	Severe NPDR	2	5.1%	13	15.1%	15		
	PDR	1	2.6%	7	8.1%	8		
Total		39	100.0%	86	100.0%	125		

Gender of study participants was significantly correlated with NCS, Stage of severity of DSPN and SSR. Gender was not significantly correlated with MNSI-A score, MNSI-B score, Classification of DPN, ABI, VPT, UACR and Fundoscopy findings.

Table 38: Correlation of Duration of diabetes group of study participants with other clinical and neuro-electrophysiological parameters

		Duration of Diabetes (years) group						Total	chi-square value	p-value
		< 5		5-10		> 10				
MNSI-A	Negative	12	48.0%	9	14.8%	3	7.7%	24	17.473	0.001
	Positive	13	52.0%	52	85.2%	36	92.3%	101		
MNSI-B	Negative	9	36.0%	8	13.1%	1	2.6%	18	13.977	0.001
	Positive	16	64.0%	53	86.9%	38	97.4%	107		
NCS	Normal	9	36.0%	9	14.8%	3	7.7%	21	9.091	0.011
	Abnormal	16	64.0%	52	85.2%	36	92.3%	104		
Classification of DPN	SUBCLINICAL	1	4.0%	1	1.6%	0	0.0%	2	15.041	0.020
	PROBABLE	1	4.0%	3	4.9%	2	5.1%	6		
	POSSIBLE	8	32.0%	6	9.8%	1	2.6%	15		
	CONFIRMED	15	60.0%	51	83.6%	36	92.3%	102		
Stage of severity	GRADE 0	9	36.0%	9	14.8%	3	7.7%	21	12.996	0.011
	GRADE 1	5	20.0%	8	13.1%	3	7.7%	16		
	GRADE 2	11	44.0%	44	72.1%	33	84.6%	88		

ABI	< 0.9	4	16.0%	13	21.3%	13	33.3%	30	9.032	0.060
	> 0.9	21	84.0%	48	78.7%	26	66.7%	95		
VPT	< 15	8	32.0%	3	4.9%	0	0.0%	11	38.842	0.001
	15-20	2	8.0%	7	11.5%	1	2.6%	10		
	20-25	7	28.0%	7	11.5%	1	2.6%	15		
	>25	8	32.0%	44	72.1%	37	94.9%	89		
SSR	Normal	5	20.0%	7	11.5%	1	2.6%	13	5.118	0.077
	Abnormal	20	80.0%	54	88.5%	38	97.4%	112		
UACR	< 30	14	56.0%	6	9.8%	2	5.1%	22	43.933	0.001
	30-300	7	28.0%	20	32.8%	4	10.3%	31		
	> 300	4	16.0%	35	57.4%	33	84.6%	72		
Fundoscopy findings	No DR	22	88.0%	28	45.9%	10	25.6%	60	42.825	0.001
	Mild NPDR	3	12.0%	15	24.6%	3	7.7%	21		
	Mod NPDR	0	0.0%	12	19.7%	9	23.1%	21		
	Severe NPDR	0	0.0%	4	6.6%	11	28.2%	15		
	PDR	0	0.0%	2	3.3%	6	15.4%	8		
Total		25	100.0%	61	100.0%	39	100.0%	125		

Duration of diabetes group of study participants was significantly correlated with MNSI-A score, MNSI-B score, NCS, Classification of DPN, Stage of severity, VPT, UACR, Fundoscopy findings. Duration of diabetes group was not significantly correlated with ABI and SSR.

Table 39: Correlation of MNSI-A score with Fasting blood glucose and HbA1c levels

	MNSI-A score	Normal	Mean	Std. Deviation	Std. Error Mean	t	p-value
Fasting blood glucose	Negative	24	140.04	45.764	9.341	-2.213	0.029
	Positive	101	166.74	54.699	5.443		
HbA1c	Negative	24	8.00	2.207	0.451	-2.366	0.029
	Positive	101	9.22	2.280	0.227		

MNSI-A score was significantly correlated with Fasting blood glucose and HbA1c levels.

Table 40: Correlation of MNSI-B score with Fasting blood glucose and HbA1c levels

	MNSI-B	Normal	Mean	Std. Deviation	Std. Error Mean	t	p-value
Fasting blood glucose	Negative	18	143.11	39.225	9.245	-1.582	0.116
	Positive	107	164.73	55.612	5.376		
HbA1c	Negative	18	8.26	2.196	0.518	-1.443	0.152
	Positive	107	9.11	2.314	0.224		

MNSI-B score was not significantly correlated with Fasting blood glucose and HbA1c levels.

Table 41: Correlation of Nerve conduction study (NCS) with Fasting blood glucose and HbA1c levels

	NCS	Normal	Mean	Std. Deviation	Std. Error Mean	t	p-value
Fasting blood glucose	Normal	21	141.86	47.675	10.404	-1.857	0.066
	Abnormal	104	165.61	54.495	5.344		
HbA1c	Normal	21	7.89	1.367	0.298	-2.436	0.016
	Abnormal	104	9.21	2.399	0.235		

Nerve conduction study (NCS) was significantly correlated with HbA1c levels but not Fasting blood glucose levels.

Table 42: Correlation of Classification of DPN with Fasting blood glucose and HbA1c levels

	Classification of DPN	Normal	Mean	Std. Deviation	Std. Error	F	p-value
Fasting blood glucose	PROBABLE	6	150.83	64.50	26.33	1.655	0.18
	POSSIBLE	15	138.27	41.39	10.69		
	CONFIRMED	102	166.44	54.68	5.41		
	SUBCLINICAL	2	123.00	15.56	11.00		
HbA1c	PROBABLE	6	7.78	0.55	0.22	2.311	0.08
	POSSIBLE	15	7.93	1.60	0.41		
	CONFIRMED	104	9.24	2.40	0.24		
	SUBCLINICAL	2	7.60	2.26	1.60		

Classification of DPN was not significantly correlated with Fasting blood glucose and HbA1c levels.

Table 43: Correlation of Stage of severity of DSPN with Fasting blood glucose and HbA1c levels

	Stage of severity	Normal	Mean	Std. Deviation	Std. Error	F	p-value
Fasting blood glucose	GRADE 0	21	141.86	47.675	10.404	2.313	0.103
	GRADE 1	16	152.31	46.255	11.564		
	GRADE 2	88	168.02	55.754	5.943		
HbA1c	GRADE 0	21	7.89	1.367	0.298	3.989	0.021
	GRADE 1	16	8.48	2.542	0.636		
	GRADE 2	88	9.34	2.363	0.252		

Stage of severity of DSPN was significantly correlated with HbA1c levels but not Fasting blood glucose levels.

Table 44: Correlation of Ankle Brachial Index (ABI) with Fasting blood glucose and HbA1c levels

	ABI	Normal	Mean	Std. Deviation	Std. Error	F	p-value
Fasting blood glucose	< 0.9	30	163.83	56.478	10.311	0.066	0.797
	> 0.9	95	160.92	53.444	5.483		
HbA1c	< 0.9	30	9.73	2.381	0.435	4.232	0.042
	> 0.9	95	8.75	2.246	0.230		

Ankle Brachial Index (ABI) was significantly correlated with HbA1c levels but not with Fasting blood glucose levels.

Table 45: Correlation of Vibration perception threshold (VPT) with Fasting blood glucose and HbA1c levels

	VPT	Normal	Mean	Std. Deviation	Std. Error	F	p-value
Fasting blood glucose	< 15	11	143.00	40.433	12.191	0.488	0.691
	15-20	10	165.80	58.461	18.487		
	20-25	15	161.13	45.893	11.849		
	>25	89	163.53	56.436	5.982		
HbA1c	< 15	11	8.36	2.710	0.817	2.558	0.058
	15-20	10	8.21	1.615	0.511		
	20-25	15	7.88	1.996	0.515		
	>25	89	9.33	2.307	0.245		

Vibration perception threshold (VPT) was not significantly correlated with Fasting blood glucose and HbA1c levels.

Table 46: Correlation of Sympathetic skin response (SSR) with Fasting blood glucose and HbA1c levels

	SSR	Normal	Mean	Std. Deviation	Std. Error	F	p-value
Fasting blood glucose	Normal	13	155.77	65.760	18.239	0.169	0.682
	Abnormal	112	162.29	52.744	4.984		
HbA1c	Normal	13	8.23	2.275	0.631	1.552	0.215
	Abnormal	112	9.07	2.306	0.218		

Sympathetic skin response (SSR) was not significantly correlated with Fasting blood glucose and HbA1c levels.

Table 47: Correlation of UACR with other clinical and neuro-electrophysiological parameters

		UACR						Total	chi-square value	p-value
		< 30		30-300		> 300				
MNSI-A score	Negative	12	54.5%	4	12.9%	8	11.1%	24	21.545	0.001
	Positive	10	45.5%	27	87.1%	64	88.9%	101		
MNSI-B score	Negative	12	54.5%	6	19.4%	0	0.0%	18	41.494	0.001
	Positive	10	45.5%	25	80.6%	72	100.0%	107		
NCS	Normal	10	45.5%	8	25.8%	3	4.2%	21	22.944	0.001
	Abnormal	12	54.5%	23	74.2%	69	95.8%	104		
Classification of DPN	SUBCLINICAL	1	4.5%	1	3.2%	0	0.0%	2	40.018	0.001
	PROBABLE	0	0.0%	3	9.7%	3	4.2%	6		
	POSSIBLE	10	45.5%	5	16.1%	0	0.0%	15		
	CONFIRMED	11	50.0%	22	71.0%	69	95.8%	102		
Stage of severity	GRADE 0	10	45.5%	8	25.8%	3	4.2%	21	28.082	0.001
	GRADE 1	5	22.7%	3	9.7%	8	11.1%	16		
	GRADE 2	7	31.8%	20	64.5%	61	84.7%	88		
ABI	< 0.9	1	4.5%	6	19.4%	23	31.9%	30	15.435	0.004
	> 0.9	21	95.5%	25	80.6%	49	68.1%	95		

VPT	< 15	10	45.5%	1	3.2%	0	0.0%	11	86.979	0.001
	15-20	2	9.1%	7	22.6%	1	1.4%	10		
	20-25	6	27.3%	8	25.8%	1	1.4%	15		
	>25	4	18.2%	15	48.4%	70	97.2%	89		
SSR	Normal	5	22.7%	6	19.4%	2	2.8%	13	10.744	0.005
	Abnormal	17	77.3%	25	80.6%	70	97.2%	112		
Fundoscopy findings	No DR	19	86.4%	24	77.4%	17	23.6%	60	43.726	0.001
	Mild NPDR	3	13.6%	3	9.7%	15	20.8%	21		
	Mod NPDR	0	0.0%	2	6.5%	19	26.4%	21		
	Severe NPDR	0	0.0%	1	3.2%	14	19.4%	15		
	PDR	0	0.0%	1	3.2%	7	9.7%	8		
Total		22	100.0%	31	100.0%	72	100.0%	125		

UACR of study participants was significantly correlated with MNSI-A score, MNSI-B score, NCS, Classification of DPN, Stage of severity, ABI, VPT, SSR and Fundoscopy findings.

Table 48: Correlation of Fundoscopy findings of study participants with other clinical and neuro-electrophysiological parameters

		Fundoscopy findings					Total	chi-square value	p-value
		No DR	Mild NPDR	Mod NPDR	Severe NPDR	PDR			
MNSI-A score	Negative	22	1	0	1	0	24	23.031	0.001
	Positive	38	20	21	14	8	101		
MNSI-B score	Negative	15	2	1	0	0	18	11.326	0.023
	Positive	45	19	20	15	8	107		
NCS	Normal	19	0	1	0	1	21	18.622	0.001
	Abnormal	41	21	20	8	14	104		
Classification of DPN	SUBCLINICAL	2	0	0	0	0	2		0.029
	PROBABLE	5	0	0	1	0	6		
	POSSIBLE	14	0	1	0	0	15	22.816	
	CONFIRMED	39	21	20	14	8	102		
Stage of severity	GRADE 0	19	0	1	1	0	21	36.646	0.001
	GRADE 1	14	1	0	1	0	16		
	GRADE 2	27	20	20	13	8	88		
ABI	< 0.9	7	9	6	5	3	30	15.366	0.052
	< 0.9	53	12	15	10	5	95		

VPT	< 15	10	1	0	0	0	11	31.738	0.002
	15-20	9	0	1	0	0	10		
	20-25	12	2	1	0	0	15		
	>25	29	18	19	15	8	89		
SSR	Normal	11	1	1	0	0	13	8.155	0.086
	Abnormal	49	20	20	15	8	112		
UACR	< 30	3	0	19	0	0	22	43.726	0.001
	30-300	3	2	24	1	1	31		
	> 300	15	19	17	7	14	72		
Total		60	21	21	15	8	125		

Fundoscopy findings of study participants was significantly correlated with MNSI-A score, MNSI-B score, NCS, Classification of DPN, Stage of severity, VPT, UACR. Fundoscopy findings was not significantly correlated with ABI and SSR.

Table 49: Correlation of MNSI-A score of study participants with neuro-electrophysiological parameters

		MNSI-A score				Total	chi-square value	p-value
		Negative		Positive				
NCS	Negative	8	33.3%	13	12.9%	21	5.809	0.016
	Positive	16	66.7%	88	87.1%	104		
ABI	< 0.9	2	8.3%	28	27.7%	30	8.297	0.016
	> 0.9	22	91.7%	73	72.3%	95		
VPT	< 15	7	29.2%	4	4.0%	11	28.344	0.001
	15-20	4	16.7%	6	5.9%	10		
	20-25	6	25.0%	9	8.9%	15		
	>25	7	29.2%	82	81.2%	89		
SSR	Normal	4	16.7%	9	8.9%	13	1.252	0.263
	Abnormal	20	83.3%	92	91.1%	112		
Total		24	100.0%	101	100.0%	125		

MNSI-A score was significantly correlated with NCS, ABI and VPT. No significant correlation was found between MNSI-A score and SSR.

Table 50: Correlation of MNSI-B score of study participants with neuro-electrophysiological parameters

		MNSI-B score				Total	chi-square value	p-value
		Negative		Positive				
NCS	Negative	14	77.8%	7	6.5%	21	55.938	0.001
	Positive	4	22.2%	100	93.5%	104		
ABI	< 0.9	1	5.6%	29	27.1%	30	7.154	0.028
	> 0.9	17	94.4%	78	72.9%	95		
VPT	< 15	10	55.6%	1	0.9%	11	84.092	0.001
	15-20	6	33.3%	4	3.7%	10		
	20-25	2	11.1%	13	12.1%	15		
	>25	0	0.0%	89	83.2%	89		
SSR	Normal	7	38.9%	6	5.6%	13	18.315	0.001
	Abnormal	11	61.1%	101	94.4%	112		
Total		18	100.0%	107	100.0%	125		

MNSI-B score was significantly correlated with NCS, ABI, VPT and SSR.

Table 51: Correlation of Nerve conduction study (NCS) of study participants with other neuro-electrophysiological parameters

	Nerve conduction study (NCS)					Total	chi-square value	p-value
		Negative		Positive				
ABI	< 0.9	2	9.5%	28	26.9%	30	2.9	0.089
	> 0.9	19	90.5%	76	73.1%	95		
VPT	< 15	9	42.9%	2	1.9%	11	74.429	0.001
	15-20	8	38.1%	2	1.9%	10		
	20-25	1	4.8%	14	13.5%	15		
	>25	3	14.3%	86	82.7%	89		
SSR	Normal	11	52.4%	2	1.9%	13	47.737	0.001
	Abnormal	10	47.6%	102	98.1%	112		
Total		21	100.0%	104	100.0%	125		

NCS of study participants was significantly correlated with VPT and SSR. NCS was not significantly correlated with ABI.

Table 52: Correlation between Duration of diabetes (years) group and Individual NCS parameters

		Duration of Diabetes (years) group						Total	chi-square value	p-value
		<5		5-10		> 10				
Median motor distal latency	Normal	22	88.0%	38	62.3%	17	43.6%	77	12.727	0.002
	Abnormal	3	12.0%	23	37.7%	22	56.4%	48		
Median motor distal amplitude	Normal	22	88.0%	37	60.7%	22	56.4%	81	7.562	0.023
	Abnormal	3	12.0%	24	39.3%	17	43.6%	44		
Median motor velocity	Normal	20	80.0%	44	72.1%	25	64.1%	89	1.928	0.381
	Abnormal	5	20.0%	17	27.9%	14	35.9%	36		
Ulnar motor distal latency	Normal	24	96.0%	55	90.2%	35	89.7%	114	0.902	0.637
	Abnormal	1	4.0%	6	9.8%	4	10.3%	11		
Ulnar motor distal amplitude	Normal	21	84.0%	38	62.3%	29	74.4%	88	4.435	0.109
	Abnormal	4	16.0%	23	37.7%	10	25.6%	37		
Ulnar motor velocity	Normal	21	84.0%	42	68.9%	23	59.0%	86	4.445	0.108
	Abnormal	4	16.0%	19	31.1%	16	41.0%	39		
Peroneal motor distal latency	Normal	16	64.0%	28	45.9%	18	46.2%	62	2.593	0.271
	Abnormal	9	36.0%	33	54.1%	21	53.8%	63		

Peroneal motor distal amplitude	Normal	14	56.0%	17	27.9%	7	17.9%	38	10.786	0.005
	Abnormal	11	44.0%	44	72.1%	32	82.1%	87		
Peroneal motor velocity	Normal	1	4.0%	0	0.0%	1	2.6%	2	2.137	0.344
	Abnormal	24	96.0%	61	100.0%	38	97.4%	123		
Tibial motor distal latency	Normal	19	76.0%	30	49.2%	15	38.5%	64	8.786	0.012
	Abnormal	6	24.0%	31	50.8%	24	61.5%	61		
Tibial motor distal amplitude	Normal	14	56.0%	22	36.1%	8	20.5%	44	8.45	0.015
	Abnormal	11	44.0%	39	63.9%	31	79.5%	81		
Tibial motor velocity	Normal	5	20.0%	9	14.8%	2	5.1%	16	3.426	0.18
	Abnormal	20	80.0%	52	85.2%	37	94.9%	109		
Median sensory latency	Normal	3	12.0%	5	8.2%	0	0.0%	8	4.304	0.116
	Abnormal	22	88.0%	56	91.8%	39	100.0%	117		
Median sensory amplitude	Normal	18	72.0%	33	54.1%	20	51.3%	71	3.019	0.221
	Abnormal	7	28.0%	28	45.9%	19	48.7%	54		
Median sensory velocity	Normal	10	40.0%	14	23.0%	3	7.7%	27	9.518	0.009
	Abnormal	15	60.0%	47	77.0%	36	92.3%	98		
Ulnar sensory latency	Normal	8	32.0%	11	18.0%	4	10.3%	23	4.808	0.090
	Abnormal	17	68.0%	50	82.0%	35	89.7%	102		

Ulnar sensory amplitude	Normal	16	64.0%	27	44.3%	16	41.0%	59	3.639	0.162
	Abnormal	9	36.0%	34	55.7%	23	59.0%	66		
Ulnar sensory velocity	Normal	18	72.0%	31	50.8%	14	35.9%	63	7.951	0.019
	Abnormal	7	28.0%	30	49.2%	25	64.1%	62		
Sural sensory latency	Normal	12	48.0%	14	23.0%	4	10.3%	30	11.970	0.003
	Abnormal	13	52.0%	47	77.0%	35	89.7%	95		
Sural sensory amplitude	Normal	11	44.0%	12	19.7%	4	10.3%	27	10.505	0.005
	Abnormal	14	56.0%	49	80.3%	35	89.7%	98		
Sural sensory velocity	Abnormal	25	100.0%	61	100.0%	39	100.0%	125		
Median F-wave latency	Normal	15	60.0%	29	47.5%	14	35.9%	58	3.621	0.164
	Abnormal	10	40.0%	32	52.5%	25	64.1%	67		
Median F-wave persistence	Normal	22	88.0%	54	88.5%	34	87.2%	110	0.041	0.980
	Abnormal	3	12.0%	7	11.5%	5	12.8%	15		
Ulnar F-wave latency	Normal	13	52.0%	26	42.6%	14	35.9%	53	1.620	0.445
	Abnormal	12	48.0%	35	57.4%	25	64.1%	72		
Ulnar F-wave persistence	Normal	22	88.0%	49	80.3%	35	89.7%	106	1.885	0.390
	Abnormal	3	12.0%	12	19.7%	4	10.3%	19		

Peroneal F-wave latency	Normal	12	48.0%	21	34.4%	10	25.6%	43	3.375	0.185
	Abnormal	13	52.0%	40	65.6%	29	74.4%	82		
Peroneal F-wave persistence	Normal	13	52.0%	24	39.3%	18	46.2%	55	1.259	0.533
	Abnormal	12	48.0%	37	60.7%	21	53.8%	70		
Tibial F-wave latency	Normal	8	32.0%	12	19.7%	2	5.1%	22	7.938	0.019
	Abnormal	17	68.0%	49	80.3%	37	94.9%	103		
Tibial F-wave persistence	Normal	16	64.0%	22	36.1%	10	25.6%	48	9.751	0.008
	Abnormal	9	36.0%	39	63.9%	29	74.4%	77		
Total		25	100.0%	61	100.0%	39	100.0%	125		

Median motor latency and amplitude, Peroneal motor amplitude, Tibial motor latency, amplitude, F-wave latency and persistence, Median sensory velocity, Ulnar sensory velocity, Sural sensory latency and amplitude showed significant correlation with duration of diabetes. Sural sensory nerve conduction velocity was abnormal in all the participants.

Table 53: Correlation of HbA1c (%) group and Individual NCS parameters

		HbA1c (%) group						Total	chi-square value	p-value
		< 6.5		6.-5-10		> 10				
Median motor distal latency	Normal	9	69.2%	50	62.5%	18	56.3%	77	0.735	0.693
	Abnormal	4	30.8%	30	37.5%	14	43.8%	48		
Median motor distal amplitude	Normal	12	92.3%	55	68.8%	14	43.8%	81	11.076	0.004
	Abnormal	1	7.7%	25	31.3%	18	56.3%	44		
Median motor velocity	Normal	10	76.9%	58	72.5%	21	65.6%	89	0.759	0.684
	Abnormal	3	23.1%	22	27.5%	11	34.4%	36		
Ulnar motor distal latency	Normal	13	100.0%	72	90.0%	29	90.6%	114	1.411	0.494
	Abnormal	0	0.0%	8	10.0%	3	9.4%	11		
Ulnar motor distal amplitude	Normal	10	76.9%	60	75.0%	18	56.3%	88	4.152	0.125
	Abnormal	3	23.1%	20	25.0%	14	43.8%	37		
Ulnar motor velocity	Normal	10	76.9%	58	72.5%	18	56.3%	86	3.258	0.196
	Abnormal	3	23.1%	22	27.5%	14	43.8%	39		
Peroneal motor distal latency	Normal	7	53.8%	45	56.3%	10	31.3%	62	5.819	0.054
	Abnormal	6	46.2%	35	43.8%	22	68.8%	63		

Peroneal motor distal amplitude	Normal	4	30.8%	28	35.0%	6	18.8%	38	2.854	0.24
	Abnormal	9	69.2%	52	65.0%	26	81.3%	87		
Peroneal motor velocity	Normal	0	0.0%	1	1.3%	1	3.1%	2	0.746	0.689
	Abnormal	13	100.0%	79	98.8%	31	96.9%	123		
Tibial motor distal latency	Normal	7	53.8%	46	57.5%	11	34.4%	64	4.933	0.085
	Abnormal	6	46.2%	34	42.5%	21	65.6%	61		
Tibial motor distal amplitude	Normal	5	38.5%	33	41.3%	6	18.8%	44	5.141	0.077
	Abnormal	8	61.5%	47	58.8%	26	81.3%	81		
Tibial motor velocity	Normal	1	7.7%	13	16.3%	2	6.3%	16	2.387	0.303
	Abnormal	12	92.3%	67	83.8%	30	93.8%	109		
Median sensory latency	Normal	0	0.0%	6	7.5%	2	6.3%	8	1.052	0.591
	Abnormal	13	100.0%	74	92.5%	30	93.8%	117		
Median sensory amplitude	Normal	8	61.5%	48	60.0%	15	46.9%	71	1.737	0.419
	Abnormal	5	38.5%	32	40.0%	17	53.1%	54		
Median sensory velocity	Normal	4	30.8%	17	21.3%	6	18.8%	27	0.805	0.669
	Abnormal	9	69.2%	63	78.8%	26	81.3%	98		
Ulnar sensory latency	Normal	2	15.4%	17	21.3%	4	12.5%	23	1.253	0.534
	Abnormal	11	84.6%	63	78.8%	28	87.5%	102		

Ulnar sensory amplitude	Normal	6	46.2%	41	51.3%	12	37.5%	59	1.74	0.419
	Abnormal	7	53.8%	39	48.8%	20	62.5%	66		
Ulnar sensory velocity	Normal	7	53.8%	43	53.8%	13	40.6%	63	1.644	0.44
	Abnormal	6	46.2%	37	46.3%	19	59.4%	62		
Sural sensory latency	Normal	4	30.8%	22	27.5%	4	12.5%	30	3.184	0.204
	Abnormal	9	69.2%	58	72.5%	28	87.5%	95		
Sural sensory amplitude	Normal	3	23.1%	21	26.3%	3	9.4%	27	3.862	0.145
	Abnormal	10	76.9%	59	73.8%	29	90.6%	98		
Median F-wave latency	Normal	6	46.2%	40	50.0%	12	37.5%	58	1.436	0.488
	Abnormal	7	53.8%	40	50.0%	20	62.5%	67		
Median F-wave persistence	Normal	12	92.3%	71	88.8%	27	84.4%	110	0.669	0.716
	Abnormal	1	7.7%	9	11.3%	5	15.6%	15		
Ulnar F-wave latency	Normal	4	30.8%	38	47.5%	11	34.4%	53	2.416	0.299
	Abnormal	9	69.2%	42	52.5%	21	65.6%	72		
Ulnar F-wave persistence	Normal	12	92.3%	69	86.3%	25	78.1%	106	1.805	0.406
	Abnormal	1	7.7%	11	13.8%	7	21.9%	19		
Peroneal F-wave latency	Normal	4	30.8%	32	40.0%	7	21.9%	43	3.412	0.182
	Abnormal	9	69.2%	48	60.0%	25	78.1%	82		

Peroneal F-wave persistence	Normal	7	53.8%	40	50.0%	8	25.0%	55	6.369	0.041
	Abnormal	6	46.2%	40	50.0%	24	75.0%	70		
Tibial F-wave latency	Normal	2	15.4%	16	20.0%	4	12.5%	22	0.936	0.626
	Abnormal	11	84.6%	64	80.0%	28	87.5%	103		
Tibial F-wave persistence	Normal	4	30.8%	35	43.8%	9	28.1%	48	2.716	0.257
	Abnormal	9	69.2%	45	56.3%	23	71.9%	77		
Total		13	100.0%	80	100.0%	32	100.0%	125		

Median motor amplitude and Peroneal F-wave persistence showed significant correlation with HbA1c levels.

Table 54: Correlation of Fasting blood glucose (mg/dl) group with Sural sensory latency and amplitude

		Fasting blood glucose (mg/dl) group				Total	Chi-square value	p-value
		< 200	200-300	300-400	> 400			
Sural sensory latency	Normal	4	20	6	0	30	1.971	0.578
	Abnormal	7	63	22	3	95		
Sural sensory amplitude	Normal	4	15	8	0	27	3.656	0.301
	Abnormal	7	68	20	3	98		
Total		11	83	28	3	125		

No significant correlation was seen between Fasting blood glucose and Sural sensory latency and amplitude.

Table 55: Correlation of Ankle Brachial Index (ABI) with Sural sensory latency and amplitude

		Ankle Brachial Index (ABI)				Total	Chi-square value	p-value
		< 0.9		> 0.9				
Sural sensory latency	Normal	5	16.7%	25	26.3%	30	1.164	0.335
	Abnormal	25	83.3%	70	73.7%	95		
Sural sensory amplitude	Normal	2	6.7%	25	26.3%	27	5.198	0.023
	Abnormal	28	93.3%	70	73.7%	98		
Total		30	100.0%	95	100.0%	125		

Sural sensory amplitude was significantly correlated with ABI. No significant correlation was seen between Sural sensory latency and ABI.

Table 56: Correlation of NCS with clinical and neuro-electrophysiological parameters

		NCS				Total	chi-square value	p-value
		Normal		Abnormal				
Age (years) group	< 50	8	38.1%	14	13.5%	22	7.966	0.047
	51-60	6	28.6%	32	30.8%	38		
	61-70	5	23.8%	35	33.7%	40		
	> 70	2	9.5%	23	22.1%	25		
Gender	F	11	52.4%	28	26.9%	39	5.275	0.022
	M	10	47.6%	76	73.1%	86		
Duration of Diabetes (years) group	<5	9	42.9%	16	15.4%	25	9.091	0.011
	5-10.0	9	42.9%	52	50.0%	61		
	> 10	3	14.3%	36	34.6%	39		
UACR	< 30	10	47.6%	12	11.5%	22	22.944	0.001
	30-300	8	38.1%	23	22.1%	31		
	> 300	3	14.3%	69	66.3%	72		
ABI	< 0.9	2	9.5%	28	26.9%	30	2.9	0.101
	> 0.9	19	90.5%	76	73.1%	95		

VPT	< 15	9	42.9%	2	1.9%	11	74.429	0.001
	15-20	8	38.1%	2	1.9%	10		
	20-25	1	4.8%	14	13.5%	15		
	>25	3	14.3%	86	82.7%	89		
MNSI-A score	Negative	8	38.1%	16	15.4%	24	5.809	0.029
	Positive	13	61.9%	88	84.6%	101		
MNSI-B score	Negative	14	66.7%	4	3.8%	18	55.938	0.001
	Positive	7	33.3%	100	96.2%	107		
SSR	Normal	11	52.4%	2	1.9%	13	47.737	0.001
	Abnormal	10	47.6%	102	98.1%	112		
Fundoscopy findings	No DR	19	90.5%	41	39.4%	60	18.622	0.001
	Mild NPDR	0	0.0%	21	20.2%	21		
	Mod NPDR	1	4.8%	20	19.2%	21		
	Severe NPDR	0	0.0%	8	7.7%	8		
	PDR	1	4.8%	14	13.5%	15		

NCS was significantly correlated with age group, gender, duration of diabetes, UACR, ABI, VPT, MNSI-A score, MNSI-B score, SSR and Fundoscopic findings. NCS was not significantly correlated with ABI.

Table 57: Correlation of Classification of DPN with clinical and neuro-electrophysiological parameters

		Classification of DPN										
		CONFIRMED		POSSIBLE		PROBABLE		SUBCLINICAL		Total	Chi-square value	p-value
Age (years) group	< 50	12	11.8%	6	40.0%	2	33.3%	2	100.0%	22	21.513	0.011
	51-60	32	31.4%	5	33.3%	1	16.7%	0	0.0%	38		
	61-70	35	34.3%	4	26.7%	1	16.7%	0	0.0%	40		
	> 70	23	22.5%	0	0.0%	2	33.3%	0	0.0%	25		
Gender	Female	28	27.5%	8	53.3%	3	50.0%	0	0.0%	39	5.986	0.112
	Male	74	72.5%	7	46.7%	3	50.0%	2	100.0%	86		
Duration of Diabetes (years) group	<5	15	14.7%	8	53.3%	1	16.7%	1	50.0%	25	15.041	0.020
	5-10.0	51	50.0%	6	40.0%	3	50.0%	1	50.0%	61		
	> 10	36	35.3%	1	6.7%	2	33.3%	0	0.0%	39		
UACR	< 30	11	10.8%	10	66.7%	0	0.0%	1	50.0%	22	4.018	0.001
	30-300	22	21.6%	5	33.3%	3	50.0%	1	50.0%	31		
	> 300	69	67.6%	0	0.0%	3	50.0%	0	0.0%	72		
ABI	< 0.9	28	27.5%	1	6.7%	1	16.7%	0	0.0%	30	3.945	0.267
	> 0.9	74	72.5%	14	93.3%	5	83.3%	2	100.0%	95		

VPT	< 15	1	1.0%	9	60.0%	0	0.0%	1	50.0%	11	104.289	0.001
	15-20	2	2.0%	6	40.0%	2	33.3%	0	0.0%	10		
	20-25	13	12.7%	0	0.0%	1	16.7%	1	50.0%	15		
	>25	86	84.3%	0	0.0%	3	50.0%	0	0.0%	89		
MNSI-A score	Normal	14	13.7%	8	53.3%	0	0.0%	2	100.0%	24	23.078	0.001
	Abnormal	88	86.3%	7	46.7%	6	100.0%	0	0.0%	101		
MNSI-B score	Normal	2	2.0%	14	93.3%	0	0.0%	2	100.0%	18	101.521	0.001
	Abnormal	100	98.0%	1	6.7%	6	100.0%	0	0.0%	107		
Fundoscopy findings	No DR	39	38.2%	14	93.3%	5	83.3%	2	100.0%	60	22.816	0.029
	Mild NPDR	21	20.6%	0	0.0%	0	0.0%	0	0.0%	21		
	Mod NPDR	20	19.6%	1	6.7%	0	0.0%	0	0.0%	21		
	Severe NPDR	14	13.7%	0	0.0%	1	16.7%	0	0.0%	15		
	PDR	8	7.8%	0	0.0%	0	0.0%	0	0.0%	8		
SSR	Normal	2	2.0%	7	46.7%	4	66.7%	0	0.0%	13	49.585	0.001
	Abnormal	100	98.0%	8	53.3%	2	33.3%	2	100.0%	112		
Total		102	100.0%	15	100.0%	6	100.0%	2	100.0%	125		

Classification of DPN was significantly correlated with age group, duration of diabetes, UACR, VPT, MNSI-A score, MNSI-B score, Fundoscopy findings, NCS and SSR. Classification of DPN was not significantly correlated with gender and ABI.

Table 58: Correlation of Stage of severity of DSPN with clinical and neuro-electrophysiological parameters

		Stage of severity of DSPN						Total	Chi-square value	p-value
		GRADE 0		GRADE 1		GRADE 2				
Age (years) group	< 50	8	38.1%	6	37.5%	8	9.1%	22	23.312	0.001
	51-60	6	28.6%	4	25.0%	28	31.8%	38		
	61-70	5	23.8%	0	0.0%	35	39.8%	40		
	> 70	2	9.5%	6	37.5%	17	19.3%	25		
Gender	Female	11	52.4%	1	6.3%	27	30.7%	39	9.040	0.011
	Male	10	47.6%	15	93.8%	61	69.3%	86		
Duration of Diabetes (years) group	< 5	9	42.9%	5	31.3%	11	12.5%	25	12.996	0.011
	5-10.0	9	42.9%	8	50.0%	44	50.0%	61		
	> 10	3	14.3%	3	18.8%	33	37.5%	39		
UACR	< 30	10	47.6%	5	31.3%	7	8.0%	22	28.082	0.001
	30-300	8	38.1%	3	18.8%	20	22.7%	31		
	> 300	3	14.3%	8	50.0%	61	69.3%	72		
ABI	< 0.9	2	9.5%	2	12.5%	26	29.5%	30	5.056	0.080
	> 0.9	19	90.5%	14	87.5%	62	70.5%	95		
VPT	< 15	9	42.9%	1	6.3%	1	1.1%	11	90.609	0.001
	15-20	8	38.1%	2	12.5%	0	0.0%	10		
	20-25	1	4.8%	6	37.5%	8	9.1%	15		
	>25	3	14.3%	7	43.8%	79	89.8%	89		

MNSI-A score	Negative	8	38.1%	16	100.0%	0	0.0%	24	93.077	0.001
	Positive	13	61.9%	0	0.0%	88	100.0%	101		
MNSI-B score	Negative	14	66.7%	2	12.5%	2	2.3%	18	57.087	0.001
	Positive	7	33.3%	14	87.5%	86	97.7%	107		
Fundoscopy findings	No DR	19	90.5%	14	87.5%	27	30.7%	60	36.646	0.001
	Mild NPDR	0	0.0%	1	6.3%	20	22.7%	21		
	Mod NPDR	1	4.8%	0	0.0%	20	22.7%	21		
	Severe NPDR	1	4.8%	1	6.3%	13	14.8%	15		
	PDR	0	0.0%	0	0.0%	8	9.1%	8		
NCS	Normal	21	100.0%	0	0.0%	0	0.0%	21	125.000	0.001
	Abnormal	0	0.0%	16	100.0%	88	100.0%	104		
SSR	Normal	11	52.4%	0	0.0%	2	2.3%	13	47.812	0.001
	Abnormal	10	47.6%	16	100.0%	86	97.7%	112		
Total		21	100.0%	16	100.0%	88	100.0%	125		

Stage of severity of DSPN was significantly correlated with age group, gender, duration of diabetes, UACR, VPT, MNSI-A score, MNSI-B score, Fundoscopy findings, NCS and SSR. Classification of DPN was not significantly correlated with ABI.

Table 59: Correlation of NCS with individual NCS parameters

	NCS					Total	chi-square value	p-value
		Normal		Abnormal				
Median motor distal latency	Normal	20	95.2%	57	54.8%	77	12.074	0.001
	Abnormal	1	4.8%	47	45.2%	48		
Median motor distal amplitude	Normal	21	100.0%	60	57.7%	81	13.711	0.001
	Abnormal	0	0.0%	44	42.3%	44		
Median motor velocity	Normal	21	100.0%	68	65.4%	89	10.21	0.001
	Abnormal	0	0.0%	36	34.6%	36		
Ulnar motor distal latency	Normal	20	95.2%	94	90.4%	114	0.513	0.474
	Abnormal	1	4.8%	10	9.6%	11		
Ulnar motor distal amplitude	Normal	20	95.2%	68	65.4%	88	7.473	0.007
	Abnormal	1	4.8%	36	34.6%	37		
Ulnar motor velocity	Normal	20	95.2%	66	63.5%	86	8.219	0.004
	Abnormal	1	4.8%	38	36.5%	39		
Peroneal motor distal latency	Normal	21	100.0%	41	39.4%	62	25.647	0.001
	Abnormal	0	0.0%	63	60.6%	63		
Peroneal motor distal amplitude	Normal	20	95.2%	18	17.3%	38	50.15	0.001
	Abnormal	1	4.8%	86	82.7%	87		
Peroneal motor velocity	Normal	1	4.8%	1	1.0%	2	1.603	0.206
	Abnormal	20	95.2%	103	99.0%	123		
Tibial motor distal latency	Normal	21	100.0%	43	41.3%	64	24.057	0.001
	Abnormal	0	0.0%	61	58.7%	61		
Tibial motor distal amplitude	Normal	21	100.0%	23	22.1%	44	46.465	0.001
	Abnormal	0	0.0%	81	77.9%	81		
Tibial motor velocity	Normal	8	38.1%	8	7.7%	16	14.469	0.001
	Abnormal	13	61.9%	96	92.3%	109		

Femoral motor latency	Normal	21	100.0%	99	95.2%	120	1.052	0.305
	Abnormal	0	0.0%	5	4.8%	5		
Femoral motor amplitude	Normal	21	100.0%	96	92.3%	117	1.726	0.350
	Abnormal	0	0.0%	8	7.7%	8		
Femoral motor velocity	Normal	20	95.2%	67	64.4%	87	7.841	0.004
	Abnormal	1	4.8%	37	35.6%	38		
Medial planter motor latency	Normal	5	23.8%	2	1.9%	7	15.832	0.001
	Abnormal	16	76.2%	102	98.1%	118		
Medial planter motor amplitude	Normal	20	95.2%	11	10.6%	31	67.149	0.001
	Abnormal	1	4.8%	93	89.4%	94		
Lateral planter motor amplitude	Normal	5	23.8%	4	3.8%	9	10.421	0.001
	Abnormal	16	76.2%	100	96.2%	116		
Median sensory latency	Normal	5	23.8%	3	2.9%	8	12.771	0.003
	Abnormal	16	76.2%	101	97.1%	117		
Median sensory amplitude	Normal	21	100.0%	50	48.1%	71	19.197	0.001
	Abnormal	0	0.0%	54	51.9%	54		
Median sensory velocity	Normal	11	52.4%	16	15.4%	27	14.122	0.001
	Abnormal	10	47.6%	88	84.6%	98		
Ulnar sensory latency	Normal	12	57.1%	11	10.6%	23	25.233	0.001
	Abnormal	9	42.9%	93	89.4%	102		
Ulnar sensory amplitude	Normal	21	100.0%	38	36.5%	59	28.235	0.001
	Abnormal	0	0.0%	66	63.5%	66		
Ulnar sensory velocity	Normal	21	100.0%	42	40.4%	63	24.840	0.001
	Abnormal	0	0.0%	62	59.6%	62		
Saphenous sensory latency	Normal	16	76.2%	8	7.7%	24	52.843	0.001
	Abnormal	5	23.8%	96	92.3%	101		
Saphenous sensory amplitude	Normal	19	90.5%	8	7.7%	27	70.707	0.001
	Abnormal	2	9.5%	96	92.3%	98		

Saphenous sensory velocity	Normal	13	61.9%	5	4.8%	18	46.210	0.001
	Abnormal	8	38.1%	99	95.2%	107		
Sural sensory latency	Normal	21	100.0%	9	8.7%	30	79.928	0.001
	Abnormal	0	0.0%	95	91.3%	95		
Sural sensory amplitude	Normal	20	95.2%	7	6.7%	27	80.822	0.001
	Abnormal	1	4.8%	97	93.3%	98		
Medial planter sensory latency	Normal	5	23.8%	2	1.9%	7	15.832	0.001
	Abnormal	16	76.2%	102	98.1%	118		
Medial planter sensory amplitude	Normal	18	85.7%	5	4.8%	23	76.173	0.001
	Abnormal	3	14.3%	99	95.2%	102		
Medial planter sensory velocity	Normal	17	81.0%	5	4.8%	22	69.853	0.001
	Abnormal	4	19.0%	99	95.2%	103		
Lateral planter sensory latency	Normal	7	33.3%	1	1.0%	8	30.565	0.001
	Abnormal	14	66.7%	103	99.0%	117		
Lateral planter sensory amplitude	Normal	16	76.2%	5	4.8%	21	63.694	0.001
	Abnormal	5	23.8%	99	95.2%	104		
Lateral planter sensory velocity	Normal	14	66.7%	4	3.8%	18	55.9.38	0.001
	Abnormal	7	33.3%	100	96.2%	107		
Supeficial peroneal sensory latency	Normal	19	90.5%	6	5.8%	25	78.354	0.001
	Abnormal	2	9.5%	98	94.2%	100		

Supeficial peroneal sensory amplitude	Normal	19	90.5%	6	5.8%	25	78.354	0.001
	Abnormal	2	9.5%	98	94.2%	100		
Supeficial peroneal sensory velocity	Normal	15	71.4%	5	4.8%	20	57.698	0.001
	Abnormal	6	28.6%	99	95.2%	105		
Median F-wave latency	Normal	19	90.5%	39	37.5%	58	19.716	0.001
	Abnormal	2	9.5%	65	62.5%	67		
Median F-wave persistence	Normal	20	95.2%	90	86.5%	110	1.252	0.263
	Abnormal	1	4.8%	14	13.5%	15		
Ulnar F-wave latency	Normal	17	81.0%	36	34.6%	53	15.361	0.001
	Abnormal	4	19.0%	68	65.4%	72		
Ulnar F-wave persistence	Normal	21	100.0%	85	81.7%	106	4.524	0.041
	Abnormal	0	0.0%	19	18.3%	19		
Peroneal F-wave latency	Normal	18	85.7%	25	24.0%	43	29.452	0.001
	Abnormal	3	14.3%	79	76.0%	82		
Peroneal F-wave persistence	Normal	18	85.7%	37	35.6%	55	17.825	0.001
	Abnormal	3	14.3%	67	64.4%	70		
Tibial F-wave latency	Normal	13	61.9%	9	8.7%	22	34.163	0.001
	Abnormal	8	38.1%	95	91.3%	103		
Tibial F-wave persistence	Normal	19	90.5%	29	27.9%	48	28.938	0.001
	Abnormal	2	9.5%	75	72.1%	77		
Total		21	100.0%	104	100.0%	125		

NCS was significantly correlated with all individual NCS parameters except Ulnar motor distal latency, Peroneal motor velocity, Femoral motor latency and amplitude and Median F-wave persistence.

Table 60: Correlation of Classification of DPN with individual NCS parameters

		Classification of DPN										
		CONFIRMED		POSSIBLE		PROBABLE		SUBCLINICAL		Total	Chi-square value	p-value
Median motor distal latency	0	55	53.9%	14	93.3%	6	100.0%	2	100.0%	77	13.915	0.003
	1	47	46.1%	1	6.7%	0	0.0%	0	0.0%	48		
Median motor distal amplitude	0	58	56.9%	15	100.0%	6	100.0%	2	100.0%	81	15.311	0.002
	1	44	43.1%	0	0.0%	0	0.0%	0	0.0%	44		
Median motor velocity	0	66	64.7%	15	100.0%	6	100.0%	2	100.0%	89	11.401	0.002
	1	36	35.3%	0	0.0%	0	0.0%	0	0.0%	36		
Ulnar motor distal latency	0	92	90.2%	14	93.3%	6	100.0%	2	100.0%	114	9.850	0.805
	1	10	9.8%	1	6.7%	0	0.0%	0	0.0%	11		
Ulnar motor distal amplitude	0	66	64.7%	14	93.3%	6	100.0%	2	100.0%	88	8.737	0.033
	1	36	35.3%	1	6.7%	0	0.0%	0	0.0%	37		
Ulnar motor velocity	0	64	62.7%	14	93.3%	6	100.0%	2	100.0%	86	9.576	0.023
	1	38	37.3%	1	6.7%	0	0.0%	0	0.0%	39		
Peroneal motor distal latency	0	39	38.2%	15	100.0%	6	100.0%	2	100.0%	62	28.641	0.001
	1	63	61.8%	0	0.0%	0	0.0%	0	0.0%	63		
Peroneal motor distal amplitude	0	16	15.7%	14	93.3%	6	100.0%	2	100.0%	38	56.831	0.001
	1	86	84.3%	1	6.7%	0	0.0%	0	0.0%	87		
Peroneal motor velocity	0	1	1.0%	1	6.7%	0	0.0%	0	0.0%	2	2.825	0.419
	1	101	99.0%	14	93.3%	6	100.0%	2	100.0%	123		
Tibial motor distal latency	0	41	40.2%	15	100.0%	6	100.0%	2	100.0%	64	26.865	0.001
	1	61	59.8%	0	0.0%	0	0.0%	0	0.0%	61		

Tibial motor distal amplitude	0	21	20.6%	15	100.0%	6	100.0%	2	100.0%	44	51.888	0.001
	1	81	79.4%	0	0.0%	0	0.0%	0	0.0%	81		
Tibial motor velocity	0	8	7.8%	6	40.0%	2	33.3%	0	0.0%	16	14.748	0.002
	1	94	92.2%	9	60.0%	4	66.7%	2	100.0%	109		
Femoral motor latency	0	97	95.1%	15	100.0%	6	100.0%	2	100.0%	120	1.174	0.759
	1	5	4.9%	0	0.0%	0	0.0%	0	0.0%	5		
Femoral motor amplitude	0	94	92.2%	15	100.0%	6	100.0%	2	100.0%	117	1.927	0.588
	1	8	7.8%	0	0.0%	0	0.0%	0	0.0%	8		
Femoral motor velocity	0	66	64.7%	15	100.0%	5	83.3%	1	50.0%	87	8.604	0.035
	1	36	35.3%	0	0.0%	1	16.7%	1	50.0%	38		
Medial planter motor latency	0	2	2.0%	4	26.7%	1	16.7%	0	0.0%	7	16.657	0.001
	1	100	98.0%	11	73.3%	5	83.3%	2	100.0%	118		
Medial planter motor amplitude	0	10	9.8%	14	93.3%	6	100.0%	1	50.0%	31	68.951	0.001
	1	92	90.2%	1	6.7%	0	0.0%	1	50.0%	94		
Lateral planter motor amplitude	0	4	3.9%	3	20.0%	2	33.3%	0	0.0%	9	11.607	0.009
	1	98	96.1%	12	80.0%	4	66.7%	2	100.0%	116		
Median sensory latency	0	3	2.9%	4	26.7%	1	16.7%	0	0.0%	8	13.514	0.004
	1	99	97.1%	11	73.3%	5	83.3%	2	100.0%	117		
Median sensory amplitude	0	50	49.0%	15	100.0%	6	100.0%	0	0.0%	71	21.118	0.001
	1	52	51.0%	0	0.0%	0	0.0%	2	100.0%	54		
Median sensory velocity	0	15	14.7%	8	53.3%	3	50.0%	1	50.0%	27	15.593	0.001
	1	87	85.3%	7	46.7%	3	50.0%	1	50.0%	98		
Ulnar sensory latency	0	11	10.8%	9	60.0%	3	50.0%	0	0.0%	23	25.671	0.001
	1	91	89.2%	6	40.0%	3	50.0%	2	100.0%	102		
Ulnar sensory amplitude	0	36	35.3%	15	100.0%	6	100.0%	2	100.0%	59	31.530	0.001
	1	66	64.7%	0	0.0%	0	0.0%	0	0.0%	66		

Ulnar sensory velocity	0	40	39.2%	15	100.0%	6	100.0%	2	100.0%	63	27.739	0.001
	1	62	60.8%	0	0.0%	0	0.0%	0	0.0%	62		
Saphenous sensory latency	0	6	5.9%	13	86.7%	3	50.0%	2	100.0%	24	67.757	0.001
	1	96	94.1%	2	13.3%	3	50.0%	0	0.0%	101		
Saphenous sensory amplitude	0	6	5.9%	15	100.0%	4	66.7%	2	100.0%	27	83.780	0.001
	1	96	94.1%	0	0.0%	2	33.3%	0	0.0%	98		
Saphenous sensory velocity	0	4	3.9%	10	66.7%	3	50.0%	1	50.0%	18	50.544	0.001
	1	98	96.1%	5	33.3%	3	50.0%	1	50.0%	107		
Sural sensory latency	0	7	6.9%	15	100.0%	6	100.0%	2	100.0%	30	89.257	0.001
	1	95	93.1%	0	0.0%	0	0.0%	0	0.0%	95		
Sural sensory amplitude	0	6	5.9%	15	100.0%	5	83.3%	1	50.0%	27	83.378	0.001
	1	96	94.1%	0	0.0%	1	16.7%	1	50.0%	98		
Medial planter sensory latency	0	2	2.0%	5	33.3%	0	0.0%	0	0.0%	7	24.854	0.001
	1	100	98.0%	10	66.7%	6	100.0%	2	100.0%	118		
Medial planter sensory amplitude	0	4	3.9%	14	93.3%	4	66.7%	1	50.0%	23	80.977	0.001
	1	98	96.1%	1	6.7%	2	33.3%	1	50.0%	102		
Medial planter sensory velocity	0	4	3.9%	13	86.7%	4	66.7%	1	50.0%	22	73.906	0.001
	1	98	96.1%	2	13.3%	2	33.3%	1	50.0%	103		
Lateral planter sensory latency	0	1	1.0%	7	46.7%	0	0.0%	0	0.0%	8	46.148	0.001
	1	101	99.0%	8	53.3%	6	100.0%	2	100.0%	117		
Lateral planter sensory amplitude	0	4	3.9%	12	80.0%	4	66.7%	1	50.0%	21	67.218	0.001
	1	98	96.1%	3	20.0%	2	33.3%	1	50.0%	104		
Lateral planter sensory velocity	0	3	2.9%	10	66.7%	4	66.7%	1	50.0%	18	59.462	0.001
	1	99	97.1%	5	33.3%	2	33.3%	1	50.0%	107		
Supeficial peroneal sensory latency	0	5	4.9%	13	86.7%	6	100.0%	1	50.0%	25	81.324	0.001
	1	97	95.1%	2	13.3%	0	0.0%	1	50.0%	100		

Supeficial peroneal sensory amplitude	0	5	4.9%	15	100.0%	4	66.7%	1	50.0%	25	83.824	0.001
	1	97	95.1%	0	0.0%	2	33.3%	1	50.0%	100		
Supeficial peroneal sensory velocity	0	4	3.9%	11	73.3%	4	66.7%	1	50.0%	20	60.939	0.001
	1	98	96.1%	4	26.7%	2	33.3%	1	50.0%	105		
Median F-wave latency	0	37	36.3%	13	86.7%	6	100.0%	2	100.0%	58	23.225	0.001
	1	65	63.7%	2	13.3%	0	0.0%	0	0.0%	67		
Median F-wave persistence	0	88	86.3%	14	93.3%	6	100.0%	2	100.0%	110	1.783	0.619
	1	14	13.7%	1	6.7%	0	0.0%	0	0.0%	15		
Ulnar F-wave latency	0	34	33.3%	11	73.3%	6	100.0%	2	100.0%	53	20.178	0.001
	1	68	66.7%	4	26.7%	0	0.0%	0	0.0%	72		
Ulnar F-wave persistence	0	83	81.4%	15	100.0%	6	100.0%	2	100.0%	106	5.052	0.168
	1	19	18.6%	0	0.0%	0	0.0%	0	0.0%	19		
Peroneal F-wave latency	0	23	22.5%	12	80.0%	6	100.0%	2	100.0%	43	35.426	0.001
	1	79	77.5%	3	20.0%	0	0.0%	0	0.0%	82		
Peroneal F-wave persistence	0	35	34.3%	12	80.0%	6	100.0%	2	100.0%	55	21.955	0.001
	1	67	65.7%	3	20.0%	0	0.0%	0	0.0%	70		
Tibial F-wave latency	0	8	7.8%	9	60.0%	4	66.7%	1	50.0%	22	36.698	0.001
	1	94	92.2%	6	40.0%	2	33.3%	1	50.0%	103		
Tibial F-wave persistence	0	27	26.5%	13	86.7%	6	100.0%	2	100.0%	48	33.743	0.001
	1	75	73.5%	2	13.3%	0	0.0%	0	0.0%	77		
Total		102	100.0%	15	100.0%	6	100.0%	2	100.0%	125		

Classification of DPN was significantly correlated with all individual NCS parameters except Ulnar motor distal latency, Peroneal motor velocity, Femoral motor latency and amplitude, Median F-wave persistence and Ulnar F-wave persistence.

Table 61: Correlation of Stage of severity of DSPN with individual NCS parameters

		Stage of severity of DSPN						Total	Chi-square value	p-value
		GRADE 0		GRADE 1		GRADE 2				
Median motor distal latency	0	20	95.2%	14	87.5%	43	48.9%	77	20.618	0.001
	1	1	4.8%	2	12.5%	45	51.1%	48		
Median motor distal amplitude	0	21	100.0%	14	87.5%	46	52.3%	81	21.076	0.001
	1	0	0.0%	2	12.5%	42	47.7%	44		
Median motor velocity	0	21	100.0%	16	100.0%	52	59.1%	89	21.259	0.001
	1	0	0.0%	0	0.0%	36	40.9%	36		
Ulnar motor distal latency	0	20	95.2%	16	100.0%	78	88.6%	114	2.691	0.260
	1	1	4.8%	0	0.0%	10	11.4%	11		
Ulnar motor distal amplitude	0	20	95.2%	14	87.5%	54	61.4%	88	11.911	0.003
	1	1	4.8%	2	12.5%	34	38.6%	37		
Ulnar motor velocity	0	20	95.2%	14	87.5%	52	59.1%	86	13.309	0.001
	1	1	4.8%	2	12.5%	36	40.9%	39		
Peroneal motor distal latency	0	21	100.0%	10	62.5%	31	35.2%	62	29.676	0.001
	1	0	0.0%	6	37.5%	57	64.8%	63		
Peroneal motor distal amplitude	0	20	95.2%	7	43.8%	11	12.5%	38	56.399	0.001
	1	1	4.8%	9	56.3%	77	87.5%	87		
Peroneal motor velocity	0	1	4.8%	0	0.0%	1	1.1%	2	1.714	0.424
	1	20	95.2%	16	100.0%	87	98.9%	123		
Tibial motor distal latency	0	21	100.0%	10	62.5%	33	37.5%	64	27.444	0.001
	1	0	0.0%	6	37.5%	55	62.5%	61		
Tibial motor distal amplitude	0	21	100.0%	7	43.8%	16	18.2%	44	50.345	0.001
	1	0	0.0%	9	56.3%	72	81.8%	81		

Tibial motor velocity	0	8	38.1%	1	6.3%	7	8.0%	16	14.505	0.001
	1	13	61.9%	15	93.8%	81	92.0%	109		
Femoral motor latency	0	21	100.0%	15	93.8%	84	95.5%	120	1.154	0.562
	1	0	0.0%	1	6.3%	4	4.5%	5		
Femoral motor amplitude	0	21	100.0%	15	93.8%	81	92.0%	117	1.792	0.408
	1	0	0.0%	1	6.3%	7	8.0%	8		
Femoral motor velocity	0	20	95.2%	11	68.8%	56	63.6%	87	8.009	0.018
	1	1	4.8%	5	31.3%	32	36.4%	38		
Medial planter motor latency	0	5	23.8%	0	0.0%	2	2.3%	7	15.964	0.001
	1	16	76.2%	16	100.0%	86	97.7%	118		
Medial planter motor amplitude	0	20	95.2%	2	12.5%	9	10.2%	31	67.187	0.001
	1	1	4.8%	14	87.5%	79	89.8%	94		
Lateral planter motor amplitude	0	5	23.8%	0	0.0%	4	4.5%	9	10.840	0.001
	1	16	76.2%	16	100.0%	84	95.5%	116		
Medial planter motor amplitude	0	21	100.0%	5	31.3%	14	15.9%	40	55.100	0.001
	1	0	0.0%	11	68.8%	74	84.1%	85		
Lateral planter motor amplitude	0	15	71.4%	2	12.5%	9	10.2%	26	39.316	0.001
	1	6	28.6%	14	87.5%	79	89.8%	99		
Median sensory latency	0	5	23.8%	0	0.0%	3	3.4%	8	13.033	0.001
	1	16	76.2%	16	100.0%	85	96.6%	117		
Median sensory amplitude	0	21	100.0%	11	68.8%	39	44.3%	71	22.490	0.001
	1	0	0.0%	5	31.3%	49	55.7%	54		
Median sensory velocity	0	11	52.4%	3	18.8%	13	14.8%	27	14.248	0.001
	1	10	47.6%	13	81.3%	75	85.2%	98		
Ulnar sensory latency	0	12	57.1%	2	12.5%	9	10.2%	23	25.280	0.001
	1	9	42.9%	14	87.5%	79	89.8%	102		

Ulnar sensory amplitude	0	21	100.0%	8	50.0%	30	34.1%	59	29.610	0.001
	1	0	0.0%	8	50.0%	58	65.9%	66		
Ulnar sensory velocity	0	21	100.0%	10	62.5%	32	36.4%	63	28.539	0.001
	1	0	0.0%	6	37.5%	56	63.6%	62		
Saphenous sensory latency	0	16	76.2%	4	25.0%	4	4.5%	24	56.494	0.001
	1	5	23.8%	12	75.0%	84	95.5%	101		
Saphenous sensory amplitude	0	19	90.5%	4	25.0%	4	4.5%	27	74.052	0.001
	1	2	9.5%	12	75.0%	84	95.5%	98		
Saphenous sensory velocity	0	13	61.9%	1	6.3%	4	4.5%	18	46.242	0.001
	1	8	38.1%	15	93.8%	84	95.5%	107		
Sural sensory latency	0	21	100.0%	3	18.8%	6	6.8%	30	80.985	0.001
	1	0	0.0%	13	81.3%	82	93.2%	95		
Sural sensory amplitude	0	20	95.2%	2	12.5%	5	5.7%	27	81.194	0.001
	1	1	4.8%	14	87.5%	83	94.3%	98		
Medial planter sensory latency	0	5	23.8%	0	0.0%	2	2.3%	7	15.964	0.001
	1	16	76.2%	16	100.0%	86	97.7%	118		
Medial planter sensory amplitude	0	18	85.7%	1	6.3%	4	4.5%	23	76.199	0.001
	1	3	14.3%	15	93.8%	84	95.5%	102		
Medial planter sensory velocity	0	17	81.0%	1	6.3%	4	4.5%	22	69.880	0.001
	1	4	19.0%	15	93.8%	84	95.5%	103		
Lateral planter sensory latency	0	7	33.3%	0	0.0%	1	1.1%	8	30.594	0.001
	1	14	66.7%	16	100.0%	87	98.9%	117		
Lateral planter sensory amplitude	0	16	76.2%	1	6.3%	4	4.5%	21	63.722	0.001
	1	5	23.8%	15	93.8%	84	95.5%	104		
Lateral planter sensory velocity	0	14	66.7%	1	6.3%	3	3.4%	18	56.027	0.001
	1	7	33.3%	15	93.8%	85	96.6%	107		

Supeficial peroneal sensory latency	0	19	90.5%	2	12.5%	4	4.5%	25	78.889	0.001
	1	2	9.5%	14	87.5%	84	95.5%	100		
Supeficial peroneal sensory amplitude	0	19	90.5%	2	12.5%	4	4.5%	25	78.889	0.001
	1	2	9.5%	14	87.5%	84	95.5%	100		
Supeficial peroneal sensory velocity	0	15	71.4%	1	6.3%	4	4.5%	20	57.728	0.001
	1	6	28.6%	15	93.8%	84	95.5%	105		
Median F-wave latency	0	19	90.5%	8	50.0%	31	35.2%	58	20.904	0.001
	1	2	9.5%	8	50.0%	57	64.8%	67		
Median F-wave persistence	0	20	95.2%	15	93.8%	75	85.2%	110	2.183	0.336
	1	1	4.8%	1	6.3%	13	14.8%	15		
Ulnar F-wave latency	0	17	81.0%	8	50.0%	28	31.8%	53	17.193	0.001
	1	4	19.0%	8	50.0%	60	68.2%	72		
Ulnar F-wave persistence	0	21	100.0%	14	87.5%	71	80.7%	106	5.012	0.082
	1	0	0.0%	2	12.5%	17	19.3%	19		
Peroneal F-wave latency	0	18	85.7%	8	50.0%	17	19.3%	43	35.099	0.001
	1	3	14.3%	8	50.0%	71	80.7%	82		
Peroneal F-wave persistence	0	18	85.7%	9	56.3%	28	31.8%	55	21.105	0.001
	1	3	14.3%	7	43.8%	60	68.2%	70		
Tibial F-wave latency	0	13	61.9%	3	18.8%	6	6.8%	22	35.492	0.001
	1	8	38.1%	13	81.3%	82	93.2%	103		
Tibial F-wave persistence	0	19	90.5%	8	50.0%	21	23.9%	48	32.847	0.001
	1	2	9.5%	8	50.0%	67	76.1%	77		
Total		21	100.0%	16	100.0%	88	100.0%	125		

Stage of severity of DSPN was significantly correlated with all individual NCS parameters except Ulnar motor distal latency, Peroneal motor velocity, Femoral motor latency and amplitude, Median F-wave persistence and Ulnar F-wave persistence.

DISCUSSION

An observational cross-sectional study was conducted in a tertiary care hospital in state of Punjab in North India. 125 patients of Type 2 Diabetes mellitus were recruited into the study after satisfying inclusion and exclusion criteria. Our aim was to study clinical and neuro-electrophysiological parameters in patients with Type 2 Diabetes Mellitus and to study association between them.

The mean age of study population was 61 ± 10.23 years (range 42-92 years), 31.2% (39) were female, mean duration of diabetes was 9.28 ± 5.97 years (range 1 to 30 years), mean blood glucose fasting was 161 ± 53.97 mg/dl (range 76 to 341 mg/dl), mean HbA1c was 8.98 ± 2.31% (range 5.7 to 15.6), 82.4% had diabetic nephropathy, 52% had diabetic retinopathy, MNSI-A score was positive in 80.8% and MNSI-B score was positive in 85.6%, NCS abnormality according to Toronto Diabetic Neuropathy Expert Group criteria[4] was present in 83.2%, Confirmed DSPN was present in 81.6%, Stage of severity of DSPN was Grade 2 in 70.4%. Vibration perception threshold (VPT) was abnormal in 91.2%, Sympathetic skin response (SSR) was abnormal in 89.6% and Ankle brachial index (ABI) was <0.9 in 24% of study population. Axonal sensorimotor polyneuropathy was the most common type of neuropathy present in 71.2% cases followed by Sensory polyneuropathy in 6.4%, Bilateral distal median neuropathy in 4.8%, Demyelinating sensorimotor polyneuropathy in 2.4%, radiculopathy in 1.6% and mononeuropahty in 1.6%.

Relationship of Nerve conduction study (NCS) with demographic, clinical, biochemical factors

In our study NCS was significantly correlated with age group, gender, duration of diabetes, MNSI-A score, MNSI-B score, UACR, Fundoscopic findings and HbA1c. NCS was not significantly correlated with fasting blood glucose.

Gauhar Hussain et al (2014) conducted a cross-sectional study to evaluate the effect of the duration of type 2 diabetes mellitus (T2DM) on the nerve conduction velocity in diabetic peripheral neuropathy. This

study showed significant electrophysiological changes with the duration of the disease.[23] Similar results were found in our study with significant correlation between NCS and duration of diabetes (p-value 0.011).

Cristina Muntean et al (2016) studied the efficiency of Michigan neuropathy screening instrument and Nerve conduction studies for the diagnosis of diabetic distal symmetric polyneuropathy (DSPN). The study aimed to assess the prevalence of DSP in their cohort, characterize it depending on glycemic control, and also to find an easy-to-apply method for DSPN screening that could be used in Romania. Among the type 2 diabetic patients investigated, 72.54% had DSPN**.** Three-quarters of them had poor glycemic control (HbA1c ≥7%). The mean HbA1c level was 9.17%. Poor glycemic control led to a more severe DSP form as proven by nerve conduction studies and clinical examination**.** The mean MNSI score for the group was 2.55, strongly correlated with nerve conduction studies.[20] Similar results were found in our study. In our study 81.6% had confirmed DSPN, 89.6% had poor glycemic control (HbA1c >6.5%), Stage of severity of DSPN was significantly correlated with HbA1c (p-value 0.021), NCS was significantly correlated with MNSI-A (p-value 0.029) and MNSI-B score (p-value 0.001).

Hamid R. Fateh et al (2015) studied the Correlation between the Michigan neuropathy screening instrument, the United Kingdom screening test, and electrodiagnosis for early detection of diabetic peripheral neuropathy. One hundred twenty-five diabetic patients (70 female, 55 male) were recruited in this study with a mean age of 58.7 ± 10.2, and the mean duration of diabetes was 10.17 ± 6.9 years. There was a significant relationship between the number of neuropathies and the mean of diabetes duration and development of retinopathy in both questionnaire evaluations and NCS. By nerve conduction study**,** neuropathy was detected in 121 (97 %) diabetic patients, were reported in order 15 (12 %) mononeuropathy (as 33 % sensory and 67 % motor neuropathy) and 106 **(**85 %) polyneuropathy (as 31 % motor and 69 % sensorimotor neuropathy).[21] In our study 125 diabetic

patients were recruited (39 female, 86 male) with a mean age 61 ± 10.23 years and a mean duration of diabetes 9.28 ± 5.97 years. Similar results were found in our study with significant correlation between duration of diabetes and MNSI-A score (p-value 0.001) and duration of diabetes and NCS (p-value 0.011), between fundoscopic findings and MNSI-A score (p-value 0.001) and between fundoscopic findings and NCS (p-value 0.001). By nerve conduction study abnormality was detected in 83.2%. Impression of nerve conduction study were reported in order Polyneuropathy in 80% (Axonal Sensorimotor polyneuropathy in 71.2%, Sensory polyneuropahty in 6.4% and Demyelinating polyneuropathy in 2.4%), Bilateral distal median neuropathy in 4.8%, Radiculopathy in 1.6% and Mononeuropahty in 1.6%.

Muhammad Umer Nisar et al (2014) conducted a study to determine the association of Diabetic Neuropathy with the Duration of Type 2 Diabetes and Glycemic Control. Duration since the diagnosis of diabetes and HbA1c levels were significantly associated with the diagnosis of neuropathy in diabetics.[24] Similar results were found in our study with significant correlation between NCS and duration of diabetes (p-value 0.011) and NCS and HbA1c (p-value 0.016).

Shivani Agarwal et al (2018) conducted a study to determine various nerve conduction parameters in neurologically asymptomatic diabetic patients in an attempt to evaluate their value in the early detection of subclinical diabetic neuropathy and to find out if any correlation exists. Sensory and motor NCS were found to be inferior in those with higher HbA1c. Latency, amplitude, and Nerve conduction velocity (NCV) of the sural nerve showed deterioration with the duration of diabetes. All parameters of the median, ulnar, and common peroneal nerves showed deterioration with the duration of diabetes except for NCV in the common peroneal nerve and persistence in the median nerve.[25] Similarly in our study NCS was significantly correlated with HbA1c (p-value 0.016). In our study Sural nerve latency and amplitude showed significant correlation with duration of diabetes. Sural nerve conduction velocity was abnormal in all the participants. Median motor latency and amplitude, Peroneal motor amplitude, median sensory

velocity, ulnar sensory velocity showed significant correlation with duration of diabetes in our study.

Yi-Ching Weng et al (2020) conducted a cross-sectional study aimed at determining the prevalence of distal symmetrical polyneuropathy (DSPN) and diabetic peripheral neuropathic pain (DPNP) in participants with type 2 diabetes mellitus (T2DM); finding the risk factors for DSPN and DPNP via biochemical tests; and correlating DSPN and DPNP with the results of electrophysiological studies, quantitative sensory tests, and neurologic examination. In all, 30% of participants had DSPN and 11% had DPNP. DSPN correlated strongly with male gender and higher HbA1c levels**;** NCS abnormality correlated with higher HbA1c levels**;** DSPN severity correlated with NCS of each stimulating nerve**.** Symptomatic diabetic polyneuropathy significantly correlated with longer disease duration, higher HbA1c levels, and abnormal vibration tests.[26] In our study 81.6% participants had confirmed DSPN. Classification of DSPN was not significantly correlated with gender (p-value 0.112) and HbA1c (p-value 0.08). Stage of severity of DSPN correlated with NCS of almost each stimulating nerve. Severity of DSPN correlated with duration of diabetes (p-value 0.020), HbA1c (p-value 0.021) and VPT (p-value 0.001).

Abeer Masood et al (2019) conducted a study on effects of HbA1c Levels on Nerve Conduction Velocity in Type 2 Diabetes Mellitus Patients. The analysis showed that the nerve conduction velocity decreased in diabetic patients with a poor glycaemic control in comparison to healthy and diabetic subjects with good glycaemic control.**[27]** Similar results were found in our study with significant correlation between NCS and HbA1c (p-value 0.016).

El-Salem et al (2009) evaluated the correlation of HbA1c levels, using the 7% cut point, with abnormal nerve conduction studies in diabetic patients in the subclinical stage of polyneuropathy. In multivariate analysis, HbA1c was the most important factor predicting higher risk of subclinical neuropathy.[28] In our study correlation was found between

classification of DSPN and HbA1c but it was not statistically significant (p-value 0.08).

Josni Khah et al (2021) studied the Relation of glycated hemoglobin with nerve conduction study and proprioception in patients with type 2 diabetes mellitus. NCS of tibial motor, peroneal motor, and sural sensory nerves was done. HbA1c showed a positive correlation with distal latency and a negative correlation with amplitude and conduction velocity.[29] Similar results were found in our study with significant correlation between NCS and HbA1c (p-value 0.016).

P. J. Dyck et al (1993) studied the prevalence by staged severity of various types of diabetic neuropathy, retinopathy, and nephropathy in a population- based cohort. They concluded that as generally believed neuropathy, retinopathy, and nephropathy are significantly associated.[30] Similar results were found in our study with significant correlation between NCS and UACR (p-value 0.001) and NCS and Fundoscopy findings (p-value 0.001).

Devika Joshi et al (2020) conducted a study that evaluated the association of preclinical peripheral neuropathy using nerve conduction studies with various grades of retinopathy. The prevalence of both sensory and combined neuropathy was seen to increase progressively with increase in severity of retinopathy. Duration and severity of retinopathy are important risk factors for peripheral neuropathy. There is a high prevalence of peripheral neuropathy among diabetics with retinopathy especially with severe grades, when neuropathy is diagnosed using nerve conduction studies.[31] Similar results were found in our study with significant correlation between NCS and Fundoscopy findings (p-value 0.001).

Saini DC et al (2021) conducted a study to evaluate the presence of nephropathy and neuropathy in patients with diabetic retinopathy (DR) and to correlate the severity of DR to that of diabetic nephropathy and diabetic neuropathy. The association of severity of DR with that of diabetic neuropathy was inconclusive.[32] In our study significant correlation was found between Fundoscopic findings and UACR (p-

value 0.001) and NCS (p-value 0.001). Fundoscopic findings were significantly correlated with stage of severity of DSPN (p-value 0.001).

Single and simple combinations of Nerve Conduction Study (NCS) parameters in detecting Diabetic Peripheral Neuropathy (DPN)

In our study Sural sensory velocity, Medial plantar motor velocity, Lateral plantar motor velocity and Lateral plantar motor latency was abnormal in all the cases.

In our study latency and amplitude of lower limb sensory nerves i.e. Sural, Saphenous and Superficial peroneal sensory nerves had sensitivity >91.2% and specificity >76.2% in detecting abnormal NCS.

In our study velocity in lower limb nerves i.e. Sural, Saphenous, Superficial peroneal, Tibial, and Peroneal nerves had sensitivity >92.3% in detecting abnormal NCS.

In our study latency, amplitude and velocity of upper limb and proximal lower limb motor nerves i.e. Median, Ulnar and Femoral motor nerves; latency and amplitude of distal lower limb motor nerves i.e. Tibial and Peroneal motor nerves had specificity > 95.2% in excluding abnormal NCS.

In our study F-wave latency and persistence of Median, Ulnar and Peroneal nerves had specificity >81% in excluding abnormal NCS.

In our study Tibial F-wave latency and persistence had sensitivity >72.1% and specificity >61.9% in detecting abnormal NCS.

In our study Medial plantar motor amplitude cut-off value of 5.5 mV had a sensitivity and specificity of 89.4% and 95.2% for detecting abnormal NCS.

In our study Medial plantar sensory amplitude cut-off value of 2 µV had a sensitivity and specificity of 95.2% and 85.7% for detecting abnormal NCS.

Henning Andersen et al (1997) examined the diagnostic sensitivity of minimal F-wave latency, F-wave persistence, motor nerve conduction velocity (MCV), and amplitude of the compound motor action potential (CMAP) of the median, ulnar, tibial, and peroneal nerves, and of sensory conduction velocity (SCV) and sensory nerve action potential (SNAP) amplitude of the sural nerve in 82 diabetic patients. In

conclusion, minimal F-wave latency was the most sensitive measure for detection of nerve pathology and should be considered in electrophysiological studies of diabetic patients.[33] In our study only Tibial F-wave latency had a high sensitivity of 91.3% in detecting abnormal NCS.

Alanna Weisman et al (2013) conducted a study to determine the performance of single and simple combinations of NCS parameters for identification and future prediction of DSP. Threshold values for peroneal conduction velocity and sural amplitude potential best identified Prevalent cases.[34] Similar results were found in our study. In our study Peroneal motor conduction velocity had a sensitivity of 99% and Sural sensory amplitude had a sensitivity of 93.3% in identifying abnormal NCS.

Kayihan Uluc et al (2018) conducted a study to evaluate the medial plantar and dorsal sural NCS in a group of diabetic patients with distal sensory neuropathy (DSN) and in healthy controls. They concluded that Bilateral NCS assessment of both of the medial plantar and dorsal sural nerves together increases the rate of diagnosis of diabetic distal sensory neuropathy compared to assessment of either of these nerves. Assessment of medial plantar in addition to dorsal sural NCS together increases the sensitivity in the detection of neuropathy and allows earlier diagnosis, especially when routine NCS are normal.[35] Similar results were found in our study. Sural sensory latency and amplitude had a sensitivity of 91.3% and 93.3% respectively in detecting abnormal NCS. Sural sensory velocity was abnormal in all the cases. Medial plantar sensory amplitude and velocity had a sensitivity of 95.2% each for detecting abnormal NCS.

Raffaele Galiero et al (2021) conducted a study to assess the ability of whole plantar nerve (WPN) conduction in diabetic PN early diagnosis. They concluded that their data support WPN conduction study reliability in characterizing the most distal sensory nerve fibres at lower limbs. Thus, WPN may represent an extremely useful diagnostic tool for diabetic PN early detection. They fixed a cut-off of WPN-SNAP amplitude of 4.55 μV and 2.65 μV, respectively [36] Similar results were

found in our study. Medial plantar motor velocity and Lateral plantar motor latency and velocity was abnormal in all the cases. In our study Medial plantar SNAP cut-off value of 2 µV had a sensitivity and specificity of 95.2% and 85.7% for detecting abnormal NCS.

Sympathetic Skin Response (SSR) test in detecting Diabetic Peripheral Neuropathy (DPN) and its correlation with Nerve conduction study (NCS), demographic, clinical and biochemical factors

In our study SSR was significantly correlated with gender, UACR, NCS, classification of DPN and stage of severity of DSPN. No significant correlation was found between SSR and age group, duration of diabetes, fasting blood glucose, HbA1c, Fundoscopic findings, MNSI-A score and MNSI-B score

Enayat Niakan et al (1988) conducted a study to determine the sensitivity of the sympathetic skin response test (SSR) for detection of sudomotor dysfunction and its correlation with other autonomic function tests, autonomic symptoms, and degree of peripheral neuropathy. Statistically significant correlation was found between the degree of peripheral neuropathy and SSR.[37] Similar results were found in our study with significant correlation between NCS and SSR (p-value 0.001).

Nazhel B et al (2002) conducted a study to perform SSR in diabetic patients to see whether this test can be used as an electrophysiological method for the diagnosis and confirmation of diabetic autonomic neuropathy. No correlation could be found between latencies and duration of sickness, patient's age, and HbA1c values.[38] Similar results were found in our study with no significant correlation between SSR and duration of diabetes (p-value 0.077), age group (p-value 0.469) and HbA1c (p-value 0.215).

Vibration Perception Threshold (VPT) in detecting Diabetic Peripheral Neuropathy (DPN) and its correlation with Nerve conduction study (NCS), demographic, clinical and biochemical factors

In our study Vibration Perception Threshold (VPT) had a sensitivity of 98.1% and specificity of 42.9% in detecting abnormal NCS.

In our study Vibration Perception Threshold (VPT) was significantly correlated with age group, duration of diabetes, UACR, Fundoscopic findings, MNSI-A and MNSI-B score, NCS, classification of DPN and Stage of severity of DSPN. No significant correlation was found between VPT and gender, fasting blood glucose and HbA1c.

Jeewandeep Kaur et al (2016) studied Vibration Perception Threshold (VPT) as a stand-alone method for identifying distal symmetrical peripheral neuropathy relative to gold standard assessments involving neurology examinations and nerve conduction studies. In the study, they found VPT as a reliable measure of DSPN (Distal Symmetrical Poly Neuropathy) and a sensitive and specific measure of definite clinical neuropathy with the highest sensitivity noted for definite clinical neuropathy (74.07%). The sensitivity of VPT to predict abnormal nerve conduction and confirmed clinical neuropathy was 50%.[40] In our study significant correlation was found between VPT and classification of DPN (p-value 0.001). VPT had 99% sensitivity in detecting confirmed DSPN. VPT had 98.1% sensitivity in detecting abnormal NCS. In our study significant correlation was found between VPT and stage of severity of DSPN (p-value 0.001).

Solanki et al (2022) studied the prevalence and correlates of vibration perception threshold based diabetic peripheral neuropathy in the Gujarati urban population. VPT >25 was considered as DPN**.** Mean age was 57, mean duration was 9.42 years, 40% were good glycemic, 28% were symptomatic for neuropathy. The presence of symptoms, duration, and family history were significant predictors of VPT, whereas age, gender, hypertension, hyperlipidemia, and glycemic control were not.[41] Using the same criteria (VPT>25) prevalence of DPN in our population was 71.2%, mean age was 61 years, mean duration of diabetes was 9.28 years, 10.4% had good glycemic control, 80.8% were symptomatic for neuropathy. In our study significant correlation was found between VPT and age group (p-value 0.001), MNSI-A (symptom) score (p-value 0.001) and duration of diabetes (p-value

0.001). No significant correlation was found between VPT and gender (p-value 0.100) and degree of glycemic control by fasting blood glucose (p-value 0.691) and HbA1c (p-value 0.058).

Ankle-Brachial Index (ABI) in detecting Vasculopathy and its correlation with Nerve conduction study (NCS), demographic, clinical and biochemical factors

In our study population 24% had Vasculopathy. Ankle-brachial index was not significantly correlated with NCS.

In our study Ankle-Brachial Index was significantly correlated with HbA1c, UACR, MNSI-A score, MNSI-B score, HbA1c and Sural sensory amplitude. No significant correlation was found between ABI and age group, gender, duration of diabetes, Fundoscopy findings, classification of DPN, stage of severity of DSPN, fasting blood glucose and sural sensory latency.

Liliana Chevtchouk et al (2017) conducted a study to evaluate neuropathic pain and peripheral vascular disease in diabetics and compare this with the length of time since diagnosis in type 1, and type 2 diabetes. They concluded that the ABI test in type 1diabetes and type 2 diabetes patients is important even in those who are asymptomatic. A diagnosis of more than 10 years prior, regardless of the presence of neuropathic pain or ischemic signs, altered the ABI.[43] In our study no significant correlation was found between ABI and duration of diabetes (p-value 0.060).

Hidetaka Hamasaki et al (2017) evaluated diabetic neuropathy by a novel device. They conducted a retrospective observational study in patients with diabetes whose sural nerve functions were measured using DPN Check between January 2015 and October 2016. Both SNCV and SNAP were inversely associated with the duration of diabetes, plasma glucose levels, and HbA1c levels at baseline, whereas these were positively associated with ankle–brachial index**.** They concluded that sural nerve functions were significantly associated with glycemic control and arteriosclerosis in patients with diabetes.[44] In our study significant correlation was found between duration of diabetes and Sural nerve latency (p-value 0.003) and sural nerve

amplitude (p-value 0.005) but correlation with HbA1c and plasma glucose levels was not statistically significant. Sural nerve amplitude was significantly correlated with Ankle Brachial Index (p-value 0.023) but sural nerve latency was not (p-value 0.335). Sural nerve velocity was abnormal in all the cases.

Iftikhar Haider Naqvi et al (2018) conducted a study titled Peripheral Neuropathy and Vasculopathy; Frequency and Associated Risk Factors in Newly Diagnosed Treatment Naive Type 2 Diabetes. It was a cross-sectional non-interventional cohort study where all newly diagnosed treatment naïve type 2 diabetic patients were enrolled. Peripheral neuropathy and vasculopathy were detected by the Michigan neuropathy screening instrument (MNSI) and ankle-brachial index (ABI) respectively. They found that 37.7% had early neuropathy with an MNSI score of 3.3 ± 0.4. 20.6% had vasculopathy with an ABI score of 0.76 ± 0.11. Age, duration of symptoms, high HbA1C %, albumin creatinine ratio, and cholesterol level were found as risk factors for early neuropathy and vasculopathy.[45] In our study MNSI-A score was positive (≥4) in 80.8% participants and MNSI-B score was positive (≥2) in 85.6% participants. Peripheral vasculopathy (ABI<0.9) was present in 24% participants. In our study NCS was significantly correlated with age group (p-value 0.047), duration of diabetes (p-value 0.011), HbA1c (p-value 0.016) and UACR (p-value 0.001). ABI was significantly correlated with HbA1c (p-value 0.042) and UACR (p-value 0.004) but no significant correlation was found between ABI and age group (p-value 0.484) and duration of diabetes (p-value 0.060).

Uni Gamayani et al (2019) studied the Correlation between Ankle-Brachial Index Score and Diabetic Polyneuropathy Degree of Severity**.** No correlation was found between ABI score and DPN severity and between ABI score and DPN symptoms, signs, and NCS abnormality. Hence, the ABI score does not correlate with the DPN severity stage.[46] Similar results were found in our study with no significant correlation between ABI and NCS abnormality (p-value 0.101) and severity of DSPN (p-value 0.080) although significant

correlation was found between ABI and MNSI-A (symptom) score (p-value 0.016) and MNSI-B (signs) score (p-value 0.028).

SUMMARY AND CONCLUSION

We aimed to study the clinical and neuro-electrophysiological parameters in patients with Type 2 Diabetes and to study association between them. A hospital based observational cross-sectional study was conducted in Department of Neurology at DMCH, Ludhiana. Total 125 participants were enrolled into the study. Our study found that Distal Symmetric Polyneuropathy (DSPN) has a high prevalence in patients with Type 2 Diabetes. Axonal sensorimotor polyneuropathy is the most common type of neuropathy in patients with Type 2 Diabetes. Nerve conduction study (NCS) abnormality by Toronto Diabetic Neuropathy Expert Group criteria[4] is significantly correlated with age, gender, duration of diabetes, signs and symptoms of diabetic neuropathy, diabetic nephropathy and diabetic retinopathy. Among other neuro-electrophysiological parameters NCS is significantly correlated with Vibration perception threshold (VPT) and Sympathetic skin response (SSR). No significant correlation was found between NCS and Ankle-Brachial Index (ABI). Among combination of NCS parameters Peroneal and Sural nerve conduction study along with Plantar nerve conduction study can diagnose early diabetic neuropathy with high sensitivity and specificity.

- The study enrolled 125 participants of Type 2 Diabetes after satisfying inclusion and exclusion criteria.
- The study population had a mean age of 61 ± 10.23 years (range 42-92 years).
- The study population had a male to female ratio of 2.20.
- The study population had a mean duration of diabetes of 9.28 ± 5.97years (range 1 to 30 years).
- The study population had a mean fasting blood glucose of 161 ± 53.97 mg/dl (range 76 to 341 mg/dl).
- The study population had a mean HbA1c of 8.98 ± 2.31% (range 5.7 to 15.6).
- MNSI-A score was positive in 80.8% of study population.
- MNSI-B score was positive in 85.6% of study population.

- Diabetic nephropathy was present in 82.4% of study population.
- Diabetic retinopathy was present in 52% of study population.
- Nerve conduction study abnormality was present in 83.2% of study population according to Toronto Diabetic Neuropathy expert group criteria[4]. High prevalence of neuropathy in our study population is because of selection bias as only patients with clinical signs and symptoms were referred for nerve conduction study.
- Confirmed Distal symmetric polyneuropathy (DSPN) was present in 81.6% of study population.
- Stage of severity of DSPN was Grade 2 in 70.4% of study population. High severity of neuropathy in our study population is because of referral bias as only patients with advanced stage of disease were referred to our centre for nerve conduction study.
- Axonal sensorimotor polyneuropathy was the most common type of neuropathy present in 71.2% of study population. The prevalence of demyelinating polyneuropathy was only 2.4%.
- Ankle-brachial index was abnormal in 24% of study participants indicating Diabetic vasculopathy.
- Vibration perception threshold (VPT) was abnormal in 91.2% of study population indicating Large fibre neuropathy.
- Sympathetic skin response (SSR) test was abnormal in 89.6% of study population indicating autonomic dysfunction.
- Age group was significantly correlated with MNSI-A score, MNSI-B score, NCS abnormality, classification of DPN, VPT and UACR. Age group was not significantly correlated with Stage of severity of DSPN, ABI, SSR and Fundoscopic findings.
- Gender of study participants was significantly correlated with NCS abnormality, Stage of severity of DSPN and SSR. Gender was not significantly correlated with MNSI-A score, MNSI-B score, classification of DPN, ABI, VPT, UACR and Fundoscopic findings.
- Duration of diabetes of study participants was significantly correlated with MNSI-A score, MNSI-B score, NCS abnormality, classification of DPN, Stage of severity of DSPN, VPT, UACR, Fundoscopic findings.

Duration of diabetes was not significantly correlated with ABI and SSR.

- HbA1c levels of study participants was significantly correlated with NCS abnormality and Stage of severity of DSPN, MNSI-A score and Ankle-Brachial Index. No significant correlation was found between HbA1c levels and classification of DPN, MNSI-B score, VPT and SSR.
- Urine albumin creatinine ration (UACR) of study participants was significantly correlated with MNSI-A score, MNSI-B score, NCS abnormality, classification of DPN, Stage of severity of DSPN, ABI, VPT, SSR and Fundoscopic findings.
- Fundoscopic findings of study participants was significantly correlated with MNSI-A score, MNSI-B score, NCS abnormality, classification of DPN, Stage of severity of DSPN, VPT, UACR. Fundoscopic findings was not significantly correlated with ABI and SSR.
- In our study age, male gender and duration of diabetes were identified as non-modifiable risk factors for diabetic neuropathy.
- Glycosylated hemoglobin (HbA1c) testing is recommended as a test of glycemic control which is a risk factor for diabetic neuropathy.
- Microvascular complications of diabetes like nephropathy, retinopathy and neuropathy occur simultaneously in patients with T2DM and severity of diabetic neuropathy is significantly correlated with diabetic nephropathy and diabetic retinopathy which signifies the shared pathophysiology of these three conditions.
- MNSI-A score ≥ 4 had 84.6% and MNSI-B score ≥ 2 had 96.62% sensitivity in detecting nerve conduction study abnormality. Hence MNSI is a sensitive tool which can be used in OPD for screening patients of T2DM with suspected DPN and for deciding which patients need to be referred to neurologists for more elaborative nerve conduction study.
- Although there is widespread involvement of motor and sensory nerves in DPN our study protocol involved Plantar nerve conduction study in addition to routine nerve conduction study. Lateral plantar

motor nerve was identified as the most common and earliest involved nerve in DPN. This is consistent with length dependent pattern of involvement in axonal neuropathy.

- Although femoral nerve is commonly involved in Diabetic amyotrophy but it's sensitivity in detecting NCS abnormality is less as shown in our study.
- Medial/ Lateral plantar motor and Sural sensory were the earliest nerves to be involved in DPN. Hence they should always be a part of protocol for testing for DPN.
- In our study axonal sensorimotor polyneuropathy was the most common type of neuropathy which is reinforced by the more common involvement of lower limb nerves as compared to upper limb nerves as seen in our study.
- In our study sensory nerves were involved earlier than motor nerves highlighting the fact that sensory symptoms predate motor symptoms in most patients of DPN.
- In our study it was found that in a patient suspected of DPN on the basis of clinical signs and symptoms, normal nerve conduction velocity in lower limb nerves has a strong negative predictive value for DPN.
- The strong highlighting point found in our study was that Medial plantar CMAP cut-off value of 5.5 mV and Medial plantar SNAP cut-off value of 2 µV is a sensitive and specific test for predicting NCS abnormality by Toronto Diabetic Neuropathy Expert Group criteria[4].
- Vibration perception threshold (VPT) measures large nerve fibre integrity.[10] VPT had 98.1% sensitivity in detecting NCS abnormality. Hence it is a good screening test for early detection of DPN and to reduce risk of foot ulceration.
- Sympathetic skin response (SSR) is most frequently used in diagnosing the functional impairment of non-myelinated postganglionic sudomotor sympathetic fibres in peripheral neuropathies.[9]. In our study it was abnormal in 89.6% of study

population. Hence it is a sensitive test for detection of autonomic dysfunction in DPN.

- Ankle-brachial index (ABI) is a simple method to screen peripheral arterial disease (PAD) and to evaluate cardiovascular (CV) prognosis in the general population.[11] Ankle-brachial index is an index for vasculopathy.[45] In our study ABI had no significant correlation with DPN or its severity. It is recommended as a separate test for detection of PAD and CV prognosis in patients with DPN.

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S No.	MRD	Initials	Age	Gender	Duration of Diabetes	Fasting blood glucose	HbA1c	UACR	Ankle-Brachial Index	Vibration Perception Threshold	MNSI-A score	MNSI-B score	Fundoscopy findings	Median motor left distal latency	Median motor left proximal latency	Median motor left distal amplitude	Median motor left proximal amplitude	Median motor left velocity	Median motor right distal latency	Median motor right proximal latency	Median motor right distal amplitude	Median motor right proximal amplitude	Median motor right velocity	Ulnar motor left distal latency	Ulnar motor left proximal latency	Ulnar motor left distal amplitude
1	1213056	SPS	57	Male	10	221	13.7	>300	0.8	>25	4	6	Moderate NPDR	4.3	9.4	5.5	5.3	45.1	4.1	9.7	4.6	4	41.1	3.5	9	5.5
2	1214202	MG	68	Female	7	128	8.4	>300	0.6	>25	4	5.5	Mild NPDR	4.9	9.9	6.4	5.7	47.5	4.2	9.2	7.9	7.1	48.5	2.7	7.7	5.5
3	1251031	AK	56	Female	8	225	15.6	>300	0.7	>25	7	8	Severe NPDR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	3.2	9.4	2.1
4	1230127	NK	45	Male	1.5	158	7.4	>300	0.5	>25	8	5	No DR	3.5	7.8	8.2	7.6	53.5	3	7.7	7.7	7.5	48.4	2.5	6.7	7.3
5	173673	SS	50	Female	17	95	8.4	>300	0.9	>25	9	3.5	No DR	3.7	7.8	9.7	9.6	56.8	3.7	8.1	9.9	9.4	52.3	2.4	6.2	9
6	173624	SL	52	Female	8	170	7	<30	1	<15	4	0	No DR	4	7.8	5.8	5.5	59.7	3.2	7.3	6.8	6.8	56.8	2.7	5.7	8.7
7	1257880	PS	43	Male	2	127	8	<30	0.9	<15	1	0	No DR	3.3	8.3	6.7	6.2	48	3.2	8.2	5.1	4.4	48	2.7	7.1	7.3
8	1252386	JK	68	Female	7	146	9.2	>300	1.4	>25	6	6	Moderate NPDR	3.9	8.6	2.1	1.9	48.4	4.1	9.1	1.6	0.9	45.5	2.7	7.1	3.2
9	487199	VK	71	Male	5	132	8.8	>300	0.6	>25	3	6	Mild NPDR	3.6	8.4	7.3	6.5	52.1	4.3	9	7.4	6.5	53.2	3	8.4	7.3
10	1230285	SG	71	Male	25	92	5.9	>300	1.3	>25	3	8	No DR	4.3	9	7.2	6.8	48.9	4.3	8.3	5.3	4.4	56.8	3.3	7.4	7.2
11	1281880	IS	72	Male	10	116	6.8	>300	1.1	>25	3	6	Severe NPDR	4.3	9.4	5.2	4.3	45.1	4.1	8.8	6.1	5.3	48.9	2.7	7.4	7.2
12	1279370	MK	66	Female	5	93	6	30-300	1	15-20	2	1.5	No DR	3.2	7.1	7.7	7.5	54.1	3.4	7.4	7.6	7	56.8	2.1	7	9
13	1281736	DS	63	Male	15	130	8.7	30-300	1.3	>25	8	8	PDR	4	8.9	5.5	5.1	47.4	4.1	5.1	5.7	9	46.9	3.3	5.2	2.2
14	1232212	KS	76	Male	3	254	11	>300	0.9	>25	1	4.5	No DR	4.3	9	7.8	7.3	48.4	4.2	9.1	8	7.6	46.9	3.5	8.8	6.4
15	1293508	BK	50	Male	4	154	8.6	>300	1.3	>25	5	6	Mild NPDR	5.2	11.7	4.7	4.3	38.2	4.9	11.8	2.9	2.6	36.2	3.3	11.2	5.9
16	1283186	HS	57	Male	12	172	11.4	>300	0.7	>25	4	6	No DR	4.2	8.8	4.3	4.1	49.5	4.2	8.9	4.5	4.3	48.9	2.8	7.3	4
17	1007947	DS	51	Male	5	116	7.2	>300	1.4	>25	9	6	No DR	4.5	10.4	4.7	4	38.7	5	10.6	2.6	1.8	41.1	3.2	8.8	3.6
18	1312688	UR	62	Female	5	134	7.8	30-300	0.9	>25	5	5	No DR	6.3	11.3	6.6	5.9	45.5	5	9.7	8.6	7.6	48.9	3.8	7.9	4.1
19	1314057	P	68	Female	25	92	7.2	<30	1.4	>25	7	6	No DR	4.5	9	5.7	4.7	51.7	5	10.4	5.1	4.4	42.2	3	7.8	6.7
20	1315340	JS	53	Male	1.5	146	12.1	<30	1.1	>25	6	5	No DR	4.3	9.3	8.2	7.2	46.5	4	9	8.1	7.2	46.5	2.9	6.7	6.1
21	1316307	SS	56	Male	10	200	9.2	>300	1.2	>25	7	5	Moderate NPDR	4.3	9.3	4.8	4	46	4.7	9.1	4	3.7	51.7	2.8	8	9.4
22	1318198	DS	65	Male	15	176	10.8	>300	0.7	>25	6	6	Moderate NPDR	4.2	9.9	5	4.1	40.4	4.1	10.4	4.3	3.7	36.2	3.5	9.2	5.4
23	1323475	GS	58	Male	1	108	6.9	<30	1.1	<15	2	0	No DR	4.3	8.6	6.4	5.7	58.8	4.3	8.6	6.3	5.4	58.8	3.1	7.9	9.7
24	1327736	SS	70	Male	10	210	8.3	30-300	1.2	15-20	7	1	No DR	3.8	8.4	7.9	7.6	50	4	8.4	7.6	7.3	52.3	3.6	7.6	9.4
25	1332774	HK	61	Female	3	84	6.9	<30	0.9	15-20	1	0	No DR	3.8	7.9	8.2	8.2	55.4	3.4	8.1	7.8	7.2	48.4	2.4	6.3	9.5
26	86714	JR	67	Male	4	112	8.4	30-300	0.6	>25	6	6	No DR	3.4	8.1	6.3	5.8	48.4	3.4	7.9	5.9	5.2	51.1	2.9	7.7	8.6
27	1338744	VS	54	Male	8	129	9.7	>300	1.2	>25	7	6	Moderate NPDR	3.7	8.1	10	9.5	52.9	3.8	8.7	9.3	8.5	46.9	2.8	6.7	6
28	1339657	RK	48	Female	15	114	11.8	>300	1.2	>25	8	10	Severe NPDR	3.8	8.5	5	4.7	48.9	4.8	9.8	4.5	3.7	46.5	2.9	8.5	3.8
29	1352800	PK	49	Female	15	116	8.4	30-300	0.7	15-20	4	1	Moderate NPDR	3.5	7.8	6.3	6.1	53.3	3.9	8.2	8	7.2	54.1	2.8	6.4	5.9
30	1356848	P	72	Male	11	108	5.8	>300	0.8	>25	7	6	No DR	4.5	9.4	6.5	5.8	46.9	4.3	9.3	6.9	5.9	46	3.1	9.2	8.3
31	1234465	MA	48	Male	8	197	9.2	>300	1.2	>25	8	8	Mild NPDR	2.9	6.9	5.2	5.2	57.5	3.2	8.1	4	3.8	46.9	2.4	6	5.1
32	1362187	RN	55	Male	4	224	8.8	30-300	1	>25	4	2	No DR	5.8	11.1	4.1	3.8	43.4	3.5	9.7	5.8	5	38.7	NR	NR	NR
33	908203	SK	77	Female	17	104	6.3	<30	0.8	>25	2	7	No DR	3.8	8.5	6.2	5.2	48.4	3.9	8.6	8.8	7.9	48.9	3.4	7.6	7.5
34	1120781	KK	53	Female	10	261	10.9	>300	1.4	>25	9	6	No DR	3.2	7.9	5.2	4.8	49.5	5	9.2	3.1	2.8	54.8	2.4	6.7	8.3
35	1362260	ST	64	Male	8	123	6.2	<30	1.2	20-25	5	1	Mild NPDR	3.8	8.6	5.1	5.1	47.9	3.9	8.3	5.4	5.3	51.7	3	8.2	3.4
36	1368493	SG	62	Female	11	146	7.4	30-300	0.7	>25	4	5.5	No DR	4.8	10	8.1	7.3	43.8	4.8	9.6	10	9.5	47.4	2.9	7.5	5.6
37	1376675	DS	55	Male	1	128	7	<30	1	20-25	4	5.5	No DR	4.7	9.8	2.8	1.9	44.7	4.2	9.2	2.6	1.8	46.5	3.3	7.5	5.7
38	1300749	BK	45	Female	3	211	14.5	<30	0.9	<15	6	0	Mild NPDR	3.4	8.4	5.4	5.1	45.5	3.3	8.5	5.3	5	44.2	3.3	8	9.6
39	1392153	SO	43	Male	1	104	6.8	<30	1	<15	1	0	No DR	3.4	7.4	14.3	13.8	57.5	2.8	7.3	11.5	11.2	52.7	2	6.4	9.6
40	1397045	JS	61	Male	1	184	7.9	<30	1	<15	1	0	No DR	3.8	9.1	11.5	10.5	48.6	3.8	9.3	11.5	11	47.3	3	8.4	9.1
41	1400544	IKJ	78	Male	25	205	7.9	>300	1.2	20-25	3	3	No DR	3.6	7.4	1.2	0.5	60.5	3.7	7.7	2.3	1.7	57.5	3.1	8.6	5.7
42	1403539	AM	53	Male	12	171	11.3	>300	0.9	>25	7	8	Severe NPDR	5	10.2	4.4	3.5	48.5	4.1	9.6	4.1	3.7	45	4.2	10.1	1.4
43	1402573	MS	44	Male	1	112	6	<30	1	<15	0	1	No DR	3.5	8	9.1	8.8	51.7	3.4	8.5	9.6	8.7	45.1	2.9	7.6	6.4
44	588464	BK	56	Female	10	76	9.6	>300	0.6	>25	8	6	Moderate NPDR	4.6	10.3	3.4	2.9	40.7	4.1	9.2	2	1.2	45.1	3	8.7	4.7
45	1406842	Kd	68	Female	11	161	8.4	>300	1.2	>25	6	6	Mild NPDR	4.8	9.8	4.2	3.4	46	5.1	10.1	4.1	3.4	46	3	7.6	6.3
46	1407261	US	71	Male	19	227	14.6	>300	1.1	>25	9	6	Moderate NPDR	4.1	9	10	9.3	47.4	4	8.9	9.8	9.1	46.4	3.2	8	7.3
47	1407901	SS	67	Female	3	112	7.2	30-300	1	20-25	4	2	No DR	3.9	7.1	7	6.7	70.8	3.9	7.6	6.9	6.6	62.2	2.9	6.6	6.3
48	1407266	Jd	55	Female	10	155	12.3	30-300	1	>25	6	6	No DR	4.8	9.8	5.4	5	46	4.5	9.5	5.2	4.9	46.5	3.2	7.6	7.3
49	384900	MK	92	Female	30	229	8.5	>300	1.4	>25	8	8	Moderate NPDR	4.8	9	1.3	1.1	55.4	6.8	11.4	1.9	1.4	50	2.5	6.9	3.4
50	1233010	GS	61	Male	6	190	8.8	30-300	1.2	20-25	6	6	No DR	4.6	9.9	5.3	5	46.7	4.1	9.6	8.6	7.8	45	3.3	9.2	7.5
51	1358079	SG	49	Male	2	108	6.7	30-300	1.1	20-25	2	5	No DR	2.9	7.5	8.5	8.1	50	2.8	7.1	9.8	9.2	52.9	2.6	6.6	8.7
52	1413471	R	60	Female	5	169	8.4	<30	1	<15	5	1	No DR	5.5	10.1	6.7	5.9	50.5	4.6	8.7	7	6.7	56.1	2.4	7.2	6.1
53	1388593	RA	49	Female	10	131	9.2	<30	1.1	15-20	6	1	No DR	3	6.1	12.6	12	75.4	3	6.6	12	11.5	63	1.9	5.1	8.9
54	1418169	KKG	53	Male	2	78	6.1	<30	1	<15	0	3	No DR	2.7	7.3	9	8.7	50.5	3.5	7.5	8.8	8.6	58.2	2.1	4.6	8
55	408064	SCB	72	Male	20	166	11.9	>300	0.5	>25	10	8	Moderate NPDR	4.9	10.6	4.1	4	40.7	4.9	10.3	4.5	4.2	42.2	3.4	10.3	8.5
56	1401637	KS	52	Male	1	149	7.4	<30	1.1	20-25	2	4.5	No DR	4.2	9.3	8.8	8.6	45.5	4.2	9.3	6.5	6.1	45.1	3.5	8.5	2.6
57	1424308	PK	65	Male	9	112	6.8	>300	1.1	>25	5	6	Mild NPDR	4	9.5	5	4.3	45.9	4.9	9.8	5	4.2	50.5	3.4	9.6	7.4
58	1328543	PK	55	Female	15	143	9.8	>300	1.4	>25	5	6	No DR	4.8	10.8	8.2	7.7	38	7.6	12.6	6.1	5.6	45.5	3.5	9.1	8.3
59	1409719	PD	56	Male	10	149	11.9	>300	0.9	15-20	2	2	No DR	5.2	10.1	7.1	6.5	46.9	5.8	10.8	6.1	5.7	46	3	7.8	6
60	1427869	KS	43	Male	5	164	12.6	30-300	1	<15	5	0	No DR	3.1	7.4	7.5	7.3	54.1	3	7.2	7.2	7.1	54.8	2.3	6.6	8
61	917363	RM	48	Male	8	218	8.4	30-300	1	15-20	7	5	No DR	3.3	7.9	11.4	10.9	50.5	3.1	7.7	9.7	9.3	50	3	7.4	7.1
62	188653	UK	75	Male	15	111	7.6	>300	0.6	>25	5	7	Severe NPDR	4.1	8.7	5.3	5	50	4.1	8.2	5.5	4.8	55.4	2.4	6.8	6.6
63	1432647	SK	45	Male	1	188	5.7	<30	1.2	20-25	2	2	No DR	4.2	10.2	6.1	5.1	45.9	3.9	9.1	5.1	4.4	48.1	3.5	8.7	6.4

S No.	MRD	Initials	Ulnar motor left proximal amplitude	Ulnar motor left velocity	Ulnar motor right distal latency	Ulnar motor right proximal latency	Ulnar motor right distal amplitude	Ulnar motor right proximal amplitude	Ulnar motor right velocity	Peroneal motor left distal latency	Peroneal motor left proximal latency	Peroneal motor left distal amplitude	Peroneal motor left proximal amplitude	Peroneal motor left velocity	Peroneal motor right distal latency	Peroneal motor right proximal latency	Peroneal motor right distal amplitude	Peroneal motor right proximal amplitude	Peroneal motor right velocity	Tibial motor left distal latency	Tibial motor left proximal latency	Tibial motor left distal amplitude	Tibial motor left proximal amplitude	Tibial motor left velocity
1	1213056	SPS	4.2	43.6	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2	1214202	MG	5.4	50	3	7.9	6.1	6	51	4	13.8	0.7	0.5	32.7	4	14.6	1.1	0.8	30.2	NR	NR	NR	NR	NR
3	1251031	AK	1.8	38.7	2.9	10.2	2.5	2.3	33.1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4	1230127	NK	6.6	57.1	3	6.9	7.5	7.4	62.3	3.9	10.1	2.7	2.5	48.8	4	11.3	2.2	1.7	40.8	3.7	11.3	8.2	7.9	42.1
5	173673	SS	8.1	62.3	2.6	6.5	8.7	8.4	61.5	3.9	12.3	2.2	1.7	35.9	3.8	12.4	2.6	2	34.7	3.9	13.9	6	5.2	31.8
6	173624	SL	7.7	80	2.4	6.4	8.8	7.8	60	4.1	10.8	4.7	4.6	44.8	3.9	10.8	4.7	4.2	43.8	4.8	11.9	8.6	7.8	45.1
7	1257880	PS	6.8	56.8	3.5	8.4	8.1	7.2	51	3.6	13.3	4.9	4.3	35.1	3.9	14.3	4.7	7.1	37.2	2.8	13.7	7.6	6.7	27.8
8	1252386	JK	2.8	54.5	2.3	7.3	3	2.4	48	3.8	12.2	1.4	1.1	35.5	4.2	12.4	1.3	1	36.8	3.4	13	0.8	0.6	33.3
9	487199	VK	7.2	48.6	2.8	7.8	8.1	7.9	52	4	17.4	0.3	0.3	22.5	4.4	15.6	0.6	0.4	26.7	NR	NR	NR	NR	NR
10	1230285	SG	6.6	58.5	2.7	8.2	7.7	7.1	43.6	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
11	1281880	IS	6.8	51.1	2.8	7.5	6.7	6.4	50.5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
12	1279370	MK	8.2	49	2.2	6.8	9.5	8.6	52.2	4.6	12	4.4	4.1	40.5	4.3	12.4	4.5	4.1	37.3	3.2	12.4	5.4	4.9	35
13	1281736	DS	8.8	43.6	3.5	2.2	3	10.2	35.6	NR	2.4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
14	1232212	KS	5.9	45.3	2.9	8.5	5.8	5.7	42.9	4.6	14.8	0.7	0.5	29.4	4.5	16.9	0.8	0.5	24.3	5.5	16.6	2.8	2.4	28.8
15	1293508	BK	5.1	32.7	3.1	11.3	5.7	5.4	31.9	5.3	16.8	1.2	1	27.8	5.2	16.2	1.2	1.1	29	4.7	20.2	2.1	1.2	22.5
16	1283186	HS	3.7	53.9	2.8	7.4	3.8	3.4	52.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
17	1007947	DS	3.4	42.5	3.3	9.5	2.3	1.8	38.7	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
18	1312688	UR	3.1	58.5	3	8.4	5.5	4.6	44.9	4.4	12.2	2.9	2.5	38.5	4.3	12.8	1.9	1.5	35.5	4.6	13	4.8	4	38.3
19	1314057	P	6.1	59.4	3.2	8.1	4	3.3	48.5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
20	1315340	JS	6.1	62.3	2.8	6.6	7.5	6.8	62.3	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
21	1316307	SS	8.6	46.5	2.8	8	9.1	8.7	45.7	4	13.9	3.8	2.9	30.5	4.3	15.2	4.5	4	27.5	5.1	15.7	5.7	4.7	30.2
22	1318198	DS	5	41.7	3.3	9.4	4.8	4.2	39.3	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	5	18.7	1	0.6	23.4
23	1323475	GS	8.7	54.2	2.6	6.8	9.2	8.3	61.9	4.8	13	4	3.6	40.5	4	13.9	4.4	4.4	33.3	4.1	14.4	6.2	5.6	34
24	1327736	SS	8.9	60.8	3.2	7.6	10.6	9.9	55.2	4.3	13.2	4.8	3.9	33.7	4.8	14.5	0.8	0.5	30.9	5.3	15.4	7.1	6.1	31.8
25	1332774	HK	8.7	60.8	2.7	7.1	9.3	9	54.5	4.3	11.9	3.1	2.9	39.2	3.6	10.9	3.2	2.5	40.8	3.6	12.8	7.5	7.4	34.8
26	86714	JR	8	50.5	2.5	7.7	9	8	46.6	NR	NR	NR	NR	NR	5.4	18.2	2.2	1.3	26.7	3.9	14.2	6.2	5.5	31.1
27	1338744	VS	5.6	60.8	2.6	7	6	5.6	55.2	3.8	12	1.6	1.1	36.1	3.9	13	1.1	0.9	32.8	4	13.4	5	4.5	34
28	1339657	RK	3.4	43.2	3.5	8.6	4.1	3.5	47.1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
29	1352800	PK	4.8	65.8	3.1	6.9	5.9	4.8	64	3.9	11.5	6.1	5.4	39.5	3.5	11.3	6.3	5.9	38.2	3.9	13.6	6.8	6.6	32.8
30	1356848	P	7.3	39.7	3.2	8.9	9.8	9	42.5	4.9	14	1.6	1.4	33.1	3.9	15.2	1.7	1.1	26.5	5.9	17	2.7	1.7	28.8
31	1234465	MA	4.1	65.8	2.3	7.1	5.3	4.9	50.5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
32	1362187	RN	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
33	908203	SK	6.6	57.1	3.4	8.3	8	7.4	49.5	4.3	13.6	2.5	2.2	32.3	4.4	13.9	1.7	1.2	31.6	4.5	17.6	1.5	1.4	24.3
34	1120781	KK	7.3	56.5	2.7	8.3	8.7	7.9	42.9	3.7	11.5	2.8	1.9	38.5	4.1	12.1	2.8	1.8	37.5	4.9	12.4	6.4	5.9	43
35	1362260	ST	3	46.6	2.8	7.7	3.2	2.6	48.5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	5.2	15.6	1.4	1.2	30.9
36	1368493	SG	4.9	51.6	2.8	8.6	5.9	5	41.7	4.8	16.2	2.9	2.4	26.5	NR	NR	NR	NR	NR	4.7	21.9	0.4	0.2	18.6
37	1376675	DS	4.7	56.5	3.4	8.4	6.2	5.6	47.5	4.9	16.6	0.8	0.3	25.5	NR	NR	NR	NR	NR	5.3	18.9	0.4	0.3	23.5
38	1300749	BK	8.9	51.1	3.2	8.4	10	9	46.2	4.9	13.9	5	4.9	33.1	4.6	13.9	5.7	4.8	32.3	4.2	14.2	6.4	6.1	32.2
39	1392153	SO	9	54.5	2.5	6.9	9	8.6	57.5	4.9	13.3	13.8	13.6	45.2	4.8	13.2	12.5	11.4	45.2	4.2	12.7	13.1	12.6	45.9
40	1397045	JS	8.5	50	3.2	9.1	9.8	8.8	45.8	4.5	14.6	5.3	4.3	35.6	4.5	14.8	5.4	5.2	35.1	4.5	17	4.7	4.7	30.3
41	1400544	IKJ	5.5	43.6	3.4	9	5.6	4.7	42.9	4.7	13	4	3.1	35.9	4.1	13.1	3.3	2.9	33.3	5.2	14.7	3.6	2.9	33.9
42	1403539	AM	1.2	43.7	3.6	9.5	1.7	0.7	43.7	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
43	1402573	MS	6	51.6	2.7	7.7	7.3	6.9	47.5	5.2	15.1	2.5	1.7	30.5	4	13	3.9	3.9	33.1	5.2	15.7	7.2	6.2	30.5
44	588464	BK	4.3	42.5	3.1	9.4	3	2.8	38.4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
45	1406842	Kd	6.9	52.7	3	7.7	6.4	5.9	50.5	4.6	15.4	0.8	0.4	37.6	4.5	15.7	0.8	0.4	38.9	5.7	20	2.6	2	39.3
46	1407261	US	7.1	50.5	3.2	8	8.2	7.6	50	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
47	1407901	SS	5.6	64	2.2	5.9	5.8	5.4	64	3.9	10.1	6.6	6	48.4	3.4	9.8	5.8	4.8	46.9	3.3	11.1	10.2	9.9	41
48	1407266	Jd	6.7	53.9	3.3	7.9	7.1	6.6	52.2	5	13.5	1.2	0.6	35.3	4.7	13.9	1.2	1.1	32.6	NR	NR	NR	NR	NR
49	384900	MK	3	54.5	2.2	6.6	4.7	3.9	54.5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
50	1233010	GS	6.6	44.1	2.9	8.8	6.1	5.7	43.7	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
51	1358079	SG	7.9	60.8	2.6	7.1	8.4	7.7	52.7	3.7	13.5	7.3	6.4	30.8	3.7	13.2	7.4	6.5	31.6	3.8	15.1	1.2	0.2	28.3
52	1413471	R	5.8	50	2.3	6.6	6.1	5.8	56.5	4.3	13.1	3.1	2.5	34.1	4.1	12.5	3.1	2.4	35.7	3.6	14.3	5.3	4.4	29.8
53	1388593	RA	8.3	76.2	1.9	5.3	8.4	8.3	70.6	3.7	8.3	6.5	6.3	64.5	2.7	9	6.8	6.3	48	2.9	9.4	10.6	9.5	49.6
54	1418169	KKG	7.3	78.4	3.2	10.9	3.6	2.6	25.8	4.6	11.9	2.7	2.3	41.1	4.6	11.5	2.7	2.4	43.8	3.4	13.3	7.5	6.4	32.5
55	408064	SCB	8.2	34.5	3.3	9.3	8.4	8	39.7	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	5.9	18.2	0.9	0.6	26
56	1401637	KS	1.7	48	3.5	8.8	2.7	2.2	44.9	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
57	1424308	PK	6.7	42.3	3	9.7	7.3	6.5	38.5	6.6	20.1	1.7	1.2	22.2	7.2	20.4	2.5	1.6	22.8	9.2	27.7	2.1	1.7	17.3
58	1328543	PK	7.5	45	3.4	9.1	7.5	7.5	43.5	4.6	15.7	1.6	1	27	4.4	14	1.5	0.8	36.5	NR	NR	NR	NR	NR
59	1409719	PD	5.4	50.5	3	7.6	6.4	6.1	52.2	3.6	11.4	2.1	1.9	38.5	3.9	11.5	2.1	1.3	39.5	5.2	16.5	4.7	3.9	28.4
60	1427869	KS	7.2	56.5	2.4	6.6	8.1	7.6	56.5	3.5	11.6	7	6.3	36.8	3.5	11.7	7	6.4	36.8	3.5	13.2	14.4	14.2	32.8
61	917363	RM	6.4	54.5	2.9	7.6	7.6	7	50.5	3.7	12.5	6.2	5.4	34.3	3.8	12.6	6.2	5.2	34.3	5	14	8.7	7.8	35.6
62	188653	UK	6	54.5	2.7	6.9	6.4	5.6	56.5	3.6	11.9	3.4	2.5	36.1	4.3	12.4	4.9	4.2	36.8	4.2	14	6.3	5.5	32.8
63	1432647	SK	5.4	46.2	3.5	8.1	6.2	5.1	52.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

S No.	MRD	Initials	Tibial motor right distal latency	Tibial motor right proximal latency	Tibial motor right distal amplitude	Tibial motor right proximal amplitude	Tibial motor right velocity	Femoral motor left latency	Femoral motor left amplitude	Femoral motor left velocity	Femoral motor right latency	Femoral motor right amplitude	Femoral motor right velocity	Medial planter motor left latency	Medial planter motor left amplitude	Medial planter motor left velocity	Medial planter motor right latency	Medial planter motor right amplitude	Medial planter motor right velocity	Lateral planter motor left latency	Lateral planter motor left amplitude	Lateral planter motor left velocity	Lateral planter motor right latency	Lateral planter motor right amplitude	Lateral planter motor right velocity	Median sensory left latency
1	1213056	SPS	NR	NR	NR	NR	NR	5.5	6.4	40.4	5.3	6.9	45	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2	1214202	MG	NR	NR	NR	NR	NR	4	4.7	53.9	4.3	5.5	41.8	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	5.5
3	1251031	AK	NR	NR	NR	NR	NR	4.5	2.5	42.4	5.9	2.1	40.1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4	1230127	NK	3.5	10.9	7.8	7.5	43	4.4	11.9	36.6	4.6	11.8	37.5	3.6	9.6	33.6	3.6	9.3	33.3	6.3	4.8	22.3	6.1	4.9	23.1	NR
5	173673	SS	4.5	14.6	4.3	3.3	31.5	4.2	6.9	45.8	4.1	7.2	46.9	3.6	6.3	33.3	3.8	7.4	31.7	4.1	3	34.1	6	2.4	23.3	3.5
6	173624	SL	4.6	11.6	7.8	7.1	45.7	3.1	5.9	59	2.9	5.9	63.2	4.1	11.2	29.3	4.5	11	27	5.6	4	25	6.2	3.5	22.6	3.7
7	1257880	PS	3.4	11.5	8.6	8.3	35.1	3	4.9	56.7	3	5.3	60	4.7	8.4	25.5	4.9	9.1	24.7	6.5	3.9	21.5	6.5	3.8	21.5	3.7
8	1252386	JK	4.8	14.7	0.4	0.3	32.5	4.1	3.1	51.2	4.4	3.2	47.7	3.9	1.3	30.8	3.4	1.7	35.7	3.5	0.8	39.9	3.8	0.9	37	NR
9	487199	VK	NR	NR	NR	NR	NR	4.2	4.4	42.1	4.5	4.5	47.2	5.3	0.5	22.9	5.9	0.4	20.3	4.9	0.3	28.5	4.9	0.2	28.6	3.9
10	1230285	SG	NR	NR	NR	NR	NR	3.1	7.2	59	3	7.3	60	6.1	1.1	19.6	7.3	0.8	16.4	NR	NR	NR	NR	NR	NR	4.4
11	1281880	IS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	4.6
12	1279370	MK	3.5	11.2	5.6	4.4	41.6	4.9	2.9	45.4	5.4	3.1	41.1	3	9	40	3.3	8.9	36.7	4.9	2.7	28.6	4	2.9	35.4	3.2
13	1281736	DS	NR	NR	NR	NR	NR	6.9	4.3	31.9	6.2	4.2	35.8	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
14	1232212	KS	4.3	16.6	2.7	2.3	26	5	8.7	44	5.1	8	43.1	3.9	3.2	31	4.7	3.1	25.8	5.5	2.3	25.6	5.3	2.4	26.5	4.1
15	1293508	BK	4.9	20.2	1.7	1.5	22.9	5.1	2.5	43.1	5.5	2.7	42.2	5.5	1.3	21.9	5.7	0.9	20.9	NR	NR	NR	NR	NR	NR	NR
16	1283186	HS	NR	NR	NR	NR	NR	7.2	3.2	31.9	6.9	3.4	33	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
17	1007947	DS	NR	NR	NR	NR	NR	4.1	4.6	53.7	4.8	5	45.8	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
18	1312688	UR	4.4	13.5	7.1	6.5	35.2	NR	NR	NR	NR	NR	NR	4.9	10.7	24.5	4.8	11.2	24.8	4.2	5.1	33.3	4.1	4.7	33.8	4.1
19	1314057	P	NR	NR	NR	NR	NR	3.4	3.6	55.1	3.5	3.2	59.7	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	5
20	1315340	JS	NR	NR	NR	NR	NR	2.7	7.2	63	3.2	7.9	54	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	3.8
21	1316307	SS	4.8	16	7.1	6.8	28.7	4.3	4.3	44.7	3.9	4.5	48.7	5.8	6.3	20.7	6	7.1	19.9	6.3	2.2	22.1	6.2	2.2	22.4	4.2
22	1318198	DS	NR	NR	NR	NR	NR	4.4	5.9	35.5	4.4	6.2	45.5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	4.4
23	1323475	GS	4.3	14.4	5.7	5	34.7	4.2	10.9	45.2	4.3	10.8	47.1	4.9	8	24.4	5.1	7.9	23.5	5.4	4.3	25.9	4.8	4.2	29.4	3.5
24	1327736	SS	4.6	15.4	8.7	7.8	29.6	3.6	9.4	53.5	3.2	9	60.3	4.6	8	26.1	5.3	9.2	22.9	5.2	3.6	27.1	5.2	4.1	27.1	3.9
25	1332774	HK	3.6	12.6	6.9	6.2	35.6	2.9	3.4	62	3.1	3.5	59	3.7	11.2	32.8	3.7	10.7	32.3	3.9	5.3	35.6	4	5.3	35.4	3.6
26	86714	JR	4.4	14.6	5.8	4.7	35.1	3.7	3.8	51.4	3.6	4.1	52.8	4.5	7.5	27	4.3	7.3	27.9	4.6	6.5	30.8	4.9	6.4	28.9	4
27	1338744	VS	4.2	13.3	4.8	4.4	35.4	NR	NR	NR	NR	NR	NR	4.4	2.1	27.4	4	2	30.3	NR	NR	NR	NR	NR	NR	3.7
28	1339657	RK	NR	NR	NR	NR	NR	4.2	2	56.9	4	2	50.7		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
29	1352800	PK	3.8	12.3	5.2	4.8	37.6	3.2	3	45.8	3.8	3.6	48.1	3.6	12	33.3	3.4	12.2	35.1	3.8	4.7	37.3	3.7	4.6	38.3	3.7
30	1356848	P	NR	NR	NR	NR	NR	3.8	2.1	33.9	4	2.3	36.4	6.4	3.7	18.7	6.3	3.4	19	5.8	1.7	24.1	5.9	1.7	23.7	4.5
31	1234465	MA	NR	NR	NR	NR	NR	5.4	6.5	40.8	5.1	6.5	46	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	3
32	1362187	RN	NR	NR	NR	NR	NR	5.9	3.3	33.9	5.5	3.5	36.4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
33	908203	SK	5	14.4	2.2	1.2	34.2	3.5	3.1	57.6	3.3	3.6	55.1	5.7	2.5	21.2	6	2.6	20.1	NR	NR	NR	NR	NR	NR	3.9
34	1120781	KK	4.6	12.4	7.8	7.4	40.8	3.2	2.5	57.1	3.2	2.8	54	4.5	8.8	26.8	4.6	8.7	26.3	6.8	3.8	20.7	6.3	3.8	22.2	4.2
35	1362260	ST	4.2	14.6	3	2.9	30.8	4.2	2.7	48.2	4.2	2.9	47.6	4.4	2.7	27.6	4	2.8	30.4	NR	NR	NR	NR	NR	NR	3.6
36	1368493	SG	NR	NR	NR	NR	NR	4.1	2.8	46.3	4.2	3	47.6	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	4.7
37	1376675	DS	5.9	22.1	0.5	0.4	19.8	4.7	3.1	46.8	5	3.7	44	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
38	1300749	BK	3.8	14.4	6.8	6.4	30.2	5.4	3.6	41.8	5.5	3.7	43	4.4	14	27.3	4.4	13.9	27.3	4.9	9.5	28.6	5	9.2	28.3	3.5
39	1392153	SO	4.5	13.1	13.9	12.9	45.6	3.4	12.6	56.7	3.8	11.8	47.4	3.8	18	32	3.7	15.6	32.4	4	8.3	35.4	4.3	8.6	32.9	3.5
40	1397045	JS	4.7	15.9	3.6	3.1	34.1	4.8	8.7	49.4	4.7	9.5	47.3	5.2	6.4	23.3	5.2	6.4	23.3	6.1	2.5	23.1	6.2	2.6	22.8	3.7
41	1400544	IKJ	5.3	14.6	4.1	3.2	34.6	4.9	6.5	41.2	4.8	6.9	41.7	4.9	3.4	24.5	4.5	3.4	26.7	4.9	0.9	28.9	5.1	0.9	27.7	3.7
42	1403539	AM	NR	NR	NR	NR	NR	NR	NR	NR	4.6	3.5	41.3	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
43	1402573	MS	4.4	14.6	6.4	6.3	31.2	3.6	5.9	50	3.8	5.1	52.6	4.2	8.7	28.9	4	8.7	30	4.9	2.5	28.9	5.1	2.5	27.7	3.3
44	588464	BK	NR	NR	NR	NR	NR	6.8	2.2	33.8	6.7	2.3	34.3	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
45	1406842	Kd	3.9	19.8	2	1.7	40.2	5	1.5	47.8	5.2	4.5	42.7	7.4	1.8	16.1	7.4	1.8	16.2	5.7	0.8	24.6	6	0.9	23.3	4.5
46	1407261	US	NR	NR	NR	NR	NR	4.8	2.7	43.8	4.9	2.8	43.3	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	4.8
47	1407901	SS	3.1	10.2	11.3	10.6	45.4	4.3	5.9	51.8	4.2	5.8	50	4	8.3	30.3	3.8	8.1	31.7	6	7.3	23.2	5.4	7.4	26.1	3.9
48	1407266	Jd	NR	NR	NR	NR	NR	4	2.1	52.5	4.3	2.1	48.8	5.7	0.2	20.9	5.5	0.6	22	6.1	0.7	22.9	5.7	0.9	22.4	3.8
49	384900	MK	NR	NR	NR	NR	NR	3.9	2.4	53.3	3.4	2.9	53.3	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
50	1233010	GS	NR	NR	NR	NR	NR	5.5	2.3	43.6	5.6	2.7	42.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	4.4
51	1358079	SG	4.8	15.4	1.5	0.7	30.2	4.9	4.6	43.3	4.8	4.3	42.1	4.7	1.2	25.3	4.4	1.3	27.6	5.4	0.9	26.1	4.8	0.9	29.2	3.2
52	1413471	R	3.5	14.4	5.3	4.4	29.4	3.8	6.1	46.3	3.6	6.1	50	4.2	4	28.4	4.1	4.4	29.6	5.5	2.6	25.5	5.4	2.6	25.9	4.4
53	1388593	RA	4.3	10.2	11.1	10.8	53.8	4.1	6.5	65	4.4	6.5	46	4.5	7.9	26.8	4	7.5	30.1	4.8	3.1	29	6.1	2.6	23.1	2.9
54	1418169	KKG	3.7	13.1	8.7	8.1	33.9	4.5	5.1	44.4	4.3	5	46	4	6.7	30.1	3.5	6.5	34.5	4.7	4.4	29.5	5	4.5	27.9	2.9
55	408064	SCB	5.4	18.1	0.6	0.3	25.2	4.2	4.2	45.8	4.4	4.3	43.2	6.4	0.9	18.8	5.9	0.9	20.4	6.2	0.5	22.5	5.7	0.5	24.6	5.2
56	1401637	KS	NR	NR	NR	NR	NR	6	2.5	33.3	5.2	2.3	35	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	4.2
57	1424308	PK	6.6	21.3	1.1	0.2	21.7	5.8	3	34.8	6	2.8	33.3	10.9	2.6	11	12	2.5	10	10.7	1	13.1	11	0.9	12.7	4.7
58	1328543	PK	NR	NR	NR	NR	NR	7	5.9	27.3	6.9	5.5	27.5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	5.2
59	1409719	PD	6	16.4	4.1	3.8	30.9	4.3	3.9	41.5	4.5	3.6	40.4	5	8.3	24.2	5.3	8	22.5	4.7	3.5	29.9	5	3.3	28.3	5.7
60	1427869	KS	2.9	13.3	14.9	14.3	30.6	3.6	4.9	53.5	4.2	4.8	42.9	3.8	15.5	31.3	3.9	16.5	30.5	5.6	6.8	25.2	5.1	6.9	27.5	2.9
61	917363	RM	3.9	13.3	8.4	8	34.2	4.2	6.2	45.8	4.1	6.2	46.3	3.7	7.1	32.8	3.5	7.2	34.8	3.8	3.2	36.7	4.5	3.4	31.3	3.2
62	188653	UK	3.7	13	5.7	5.1	34.2	4.2	5.2	45.8	4.1	5	42.7	5	6.5	23.8	4.7	6.3	25.5	4.1	4.5	33.8	4.4	4.1	31.5	3.9
63	1432647	SK	NR	NR	NR	NR	NR	6.8	4.8	28.1	6.5	4.7	29.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	3.8

S No.	MRD	Initials	Median sensory left amplitude	Median sensory left velocity	Median sensory right latency	Median sensory right amplitude	Median sensory right velocity	Ulnar sensory left latency	Ulnar sensory left amplitude	Ulnar sensory left velocity	Ulnar sensory right latency	Ulnar sensory right amplitude	Ulnar sensory right velocity	Saphenous sensory left latency	Saphenous sensory left amplitude	Saphenous sensory left velocity	Saphenous sensory right latency	Saphenous sensory right amplitude	Saphenous sensory right velocity	Sural sensory left latency	Sural sensory left amplitude	Sural sensory left velocity	Sural sensory right latency	Sural sensory right amplitude	Sural sensory right velocity
1	1213056	SPS	NR	NR	4.4	5.2	46.1	4.2	12.4	47.9	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2	1214202	MG	7.2	33.7	4.6	6.8	37.8	4	16.1	44.9	4	13.3	45.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
3	1251031	AK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4	1230127	NK	NR	NR	NR	NR	NR	2.8	15.8	71.4	2.7	15.8	70.7	3.2	3.3	55.6	3.4	4.1	60	3.4	8.4	62.5	3.1	9.2	65.4
5	173673	SS	44	49.6	3.7	40.2	50	2.7	41.9	72.2	2.6	42.6	72.9	NR	NR	NR	NR	NR	NR	3.9	10.5	47.9	4.1	11.1	47.6
6	173624	SL	42.2	50.7	3.8	45.5	49	2.8	30.6	68.6	2.8	28.6	70.7	2.6	10.7	62.5	3.2	9.1	51.3	2.8	22.8	69.3	2.7	21.9	72.2
7	1257880	PS	29.3	52.2	3.9	25.6	47.3	3.4	23.8	62.5	3.3	19.4	56.9	4.4	8.8	36.3	4.8	9	35	4.4	13	43.2	4.1	14.9	46.1
8	1252386	JK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
9	487199	VK	14.6	50	4	13.3	47.6	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
10	1230285	SG	7	46.7	4.1	5.8	40.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
11	1281880	IS	8	38.9	4.4	7.5	44.3	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
12	1279370	MK	43.9	59.8	3.3	44.5	59.8	2.5	30.2	75.3	2.6	27.9	72.9	3.4	9.6	49.2	3.5	9.6	53.7	3.1	11.6	68	2.7	11.2	70.7
13	1281736	DS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
14	1232212	KS	13.5	44	3.9	12.6	46.7	3.9	8.6	57.4	3.7	8	49.3	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
15	1293508	BK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
16	1283186	HS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
17	1007947	DS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
18	1312688	UR	13.2	40.9	4.2	12.4	41.9	3.4	11.8	62.5	3.3	13.8	56.9	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
19	1314057	P	4.9	34.7	4.9	5.5	33.5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
20	1315340	JS	17.4	50	3.8	16.2	47.3	3.3	14	55.1	3	15.9	60.3	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
21	1316307	SS	21.4	39.1	4.2	19.9	42.9	3.3	18.9	55.6	3.3	18.5	54.7	NR	NR	NR	NR	NR	NR	4.1	12.4	44.9	4	11.3	45.5
22	1318198	DS	11.1	40.7	4.3	8.8	44	4.2	8.7	44	3.9	8.6	50.4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
23	1323475	GS	26.6	52.6	3.5	29.5	53.4	3.5	23.5	51.1	3.5	22.9	50.7	3.4	8	52	3.7	7.8	43	3.5	14.6	49.3	3.6	13.4	49.6
24	1327736	SS	27.8	43.2	4.1	14	46.1	3.7	16.6	51.1	3.6	16	56	3	5.1	2	3.3	6	50	3.9	11.7	52.2	3.8	9.5	49.3
25	1332774	HK	31.9	48.6	3.5	24	49.6	2.9	30.7	64.8	2.9	28.3	69.3	3.3	10	50.8	3.9	13	47.8	3.2	13.3	60.9	3	14.1	68.6
26	86714	JR	9.1	42.9	4	9.7	44.3	3.3	6.8	52.2	3.3	6.5	59.3	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
27	1338744	VS	15	47	3.6	13.8	49	2.9	28	70	2.9	28.7	66.7	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
28	1339657	RK	NR	NR	NR	NR	NR	4.1	6.4	45.5	4.2	4.7	42.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
29	1352800	PK	17.2	46.4	4.1	19.1	42.9	2.7	32.1	69.3	2.7	28	68	3.9	9.3	42.4	3.9	9.5	42.7	3.2	20.9	56.9	3.2	19.4	55.1
30	1356848	P	14.9	39.5	4.3	12.9	40.5	4.3	16.5	42.7	4.2	17.7	43.2	NR	NR	NR	NR	NR	NR	4.2	4.2	46.7	4	3.2	46.7
31	1234465	MA	39.4	62.5	2.9	9.9	60.3	2.7	33.2	72.2	2.6	30.2	72.9	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
32	1362187	RN	NR	NR	NR	NR	NR	NR	NR	NR	3.4	3.9	50.7	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
33	908203	SK	27	49.3	4.3	34.3	41.2	3.8	20.4	53	3.7	21	56.9	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
34	1120781	KK	11.3	40.5	5	11.5	38.9	3.2	25.5	59.8	3.2	23.8	61.9	3.2	9.9	49.6	3.3	11.5	48	3.6	11.8	52.6	2.9	13.6	74.5
35	1362260	ST	12.3	49.6	3.7	13.7	48.3	3.5	13.2	58.3	3.3	16.3	54.7	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
36	1368493	SG	15	37.2	4.5	16.4	37.4	3.3	12.5	53.8	3.2	12.8	56.5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
37	1376675	DS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
38	1300749	BK	24.1	50.7	3.5	27	53.4	3.2	23.4	56.5	3.2	19.9	54.7	3.6	8.8	52.8	3.7	10.7	43	3.5	13.4	57.9	3.5	12.9	58.3
39	1392153	SO	49.4	52.6	3.7	47	50	3.1	37.7	63.6	2.9	39.5	67.3	3	14	58.6	3.2	13.6	53.6	3.1	32.9	60.3	3.9	26.3	45.8
40	1397045	JS	24	47	3.8	25.4	47	3.3	18.2	53.4	3.3	19.6	53.8	3.8	11	46.4	3.8	9.3	45.5	3.9	12.9	46.7	4	11.1	48.6
41	1400544	IKJ	17.1	47.6	3.8	12.9	46.4	3.2	15.1	58.3	3.2	16.4	58.3	4.1	8.8	41.2	4.2	8.9	39.3	4.5	12.4	43.6	4.2	10.1	42.8
42	1403539	AM	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
43	1402573	MS	3.6	51.9	3.3	3.5	51	3.1	33.1	57.9	3.1	33.3	56.5	3.7	11.6	49.3	3.7	11	43.8	3.4	26.4	53	3.4	26	54.3
44	588464	BK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
45	1406842	Kd	12.5	38	4.9	12.2	34.7	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
46	1407261	US	15.8	38.9	4.2	15.8	37.6	3.3	14.7	54.7	3.3	14.9	56.5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
47	1407901	SS	29.6	45.8	4.3	24.2	46.4	2.8	36.5	67.3	2.6	38.5	70.7	3.8	11.3	44	3.8	10.3	50	2.9	17	68	3.1	16.2	64.2
48	1407266	Jd	20.1	50	3.9	20	50.7	3.5	28.4	54.3	3.5	24.7	52.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
49	384900	MK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
50	1233010	GS	13	39.1	3.9	13.7	43.5	3.9	8.6	48.3	3.9	5	49.3	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
51	1358079	SG	22.9	54.7	3	25.6	63.6	2.8	23.8	64.2	2.7	30.5	68	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
52	1413471	R	26.4	40.9	3.9	26.8	47.3	2.8	29.5	64.2	2.9	30.5	63.6	3.6	10.8	63.1	3.2	10.6	62.5	2.7	16.4	75.3	2.6	16.5	73.7
53	1388593	RA	64.9	61.4	2.9	60.5	63.1	2.3	60.3	68.2	2.2	61.1	81.4	3.1	17	36.1	3	18.2	38.3	2.8	35.3	67.3	2.6	31.7	145.8
54	1418169	KKG	66.2	64.2	3.5	64.1	51.9	2.7	75.1	68.6	2.7	65.6	70	4.5	10.6	36	4.4	10.7	38.3	3.5	18	50.4	3.2	18.4	55.6
55	408064	SCB	13.7	31.7	5.2	15.4	32.7	3.5	19	49.3	3.3	15.1	55.1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
56	1401637	KS	13.4	43.5	4.3	14.5	45.8	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
57	1424308	PK	12.1	34.7	5.4	14.3	31.1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
58	1328543	PK	13.3	34.5	6.5	12	28	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	4.6	5.3	40.5	4.6	6.1	41.4
59	1409719	PD	12.4	28.1	6.7	12.1	26.5	3.2	20.1	60.3	3.3	18.8	52.6	4.2	4.5	41.4	3.8	4.4	39.4	3.2	8.1	58.8	2.8	8.6	72.9
60	1427869	KS	54.3	61.4	2.8	56.1	68	2.8	40.2	76.9	2.7	36.7	72.9	4	14.2	44	3.9	14.5	44	3.1	30.2	61.9	3.1	26.9	59.3
61	917363	RM	40.4	54.7	3.3	40.6	54.7	3.1	36.5	58.3	2.9	34.5	63.1	4.7	12.1	37.6	4.2	12.6	41.2	3.8	20.5	52.6	3.4	22.2	63.6
62	188653	UK	16.1	47	4.1	18.4	46.4	3.2	16.1	57.9	3.2	18.1	57.9	4.5	4.6	44.9	4.8	3.5	39.5	4.3	6.5	46.4	4	5.5	46.7
63	1432647	SK	15.1	48.6	3.9	15.1	47.6	3.3	8.7	53.4	3.4	9.1	55.6	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

S No.	MRD	Initials	Medial planter sensory left latency	Medial planter sensory left amplitude	Medial planter sensory left velocity	Medial planter sensory right latency	Medial planter sensory right amplitude	Medial planter sensory right velocity	Lateral planter sensory left latency	Lateral planter sensory left amplitude	Lateral planter sensory left velocity	Lateral planter sensory right latency	Lateral planter sensory right amplitude	Lateral planter sensory right velocity	Supeficial peroneal sensory left latency	Supeficial peroneal sensory left amplitude	Supeficial peroneal sensory left velocity	Supeficial peroneal sensory right latency	Supeficial peroneal sensory right amplitude	Superficial peroneal sensory right velocity	Median left fwave latency	Median left fwave persistence	Median right fwave latency	Median right fwave persistence	Ulnar left fwave latency
1	1213056	SPS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	30.7	90	30.8	72	34.1
2	1214202	MG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	31.2	81	30.3	81	30.6
3	1251031	AK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	36.9
4	1230127	NK	3.1	4.6	68.8	4	4.8	56.2	3.8	7.1	66.2	4.5	6	55.2	NR	NR	NR	NR	NR	NR	25.6	81	26.6	72	26.6
5	173673	SS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	3.3	5.6	44.4	3.8	4.4	39.7	25.9	81	26.9	81	24.9
6	173624	SL	3.3	3.5	66.4	3.3	2.7	72	2.1	2.7	114.9	2	3.9	123.5	2.9	15.6	59.4	2.8	14.2	64.5	24.1	91	23.7	91	23.5
7	1257880	PS	3.1	3.3	69.9	4	4.9	53.7	3.6	3.6	59.5	3.4	4	68	4.2	11.4	36.4	4.1	13.6	39.5	30	91	31.7	91	32.1
8	1252386	JK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	29.2	91	30	91	27.4
9	487199	VK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	30.1	83	31.4	91	33.1
10	1230285	SG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	28.6	91	29	91	28.4
11	1281880	IS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	34.9	91	33	83	32.1
12	1279370	MK	3.6	7.8	62.5	4.6	8.8	49.7	3.7	2.9	71.4	3.6	3	64.1	2.8	15.5	59.3	2.9	14	64.8	24.4	91	26.6	92	25
13	1281736	DS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	33	83	32.5	83	39.5
14	1232212	KS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	33.4	91	31.9	91	36.4
15	1293508	BK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
16	1283186	HS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	35	92	36.1	83	35.2
17	1007947	DS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	35.7	63	35.2	72	35.6
18	1312688	UR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	26	72	30.8	63	31.1
19	1314057	P	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	30.1	90	33.7	90	30.3
20	1315340	JS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	32.3	91	30.1	91	25.9
21	1316307	SS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	3.6	10	46.2	3	7.4	60	31.5	90	31.1	90	30.3
22	1318198	DS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	37.6	63	35.4	45	36.7
23	1323475	GS	NR	NR	NR	3.3	2.4	63.3	NR	NR	NR	8.3	2.5	33.3	3.7	11.6	48.4	3.8	11.3	47.2	29.1	81	29.2	100	29.9
24	1327736	SS	4.1	3.6	64	2.9	4.6	88	2.6	3.5	89.3	2.6	5	99	4.6	9.5	37	4.4	8.9	39.2	29.9	90	30.1	91	32.5
25	1332774	HK	3.8	4.2	56.9	3.3	4.4	71.2	NR	NR	NR	NR	NR	NR	2.7	13.4	56.6	3.4	11.1	49.6	26.3	81	27.5	81	27.5
26	86714	JR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	31.6	90	30.6	81	29.6
27	1338744	VS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	27.5	90	29.7	72	27.9
28	1339657	RK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	31	90	35	91	38.3
29	1352800	PK	3.6	3.6	65.1	2.9	5	77.2	2.4	3.9	91	2.8	3.6	81.3	3.3	18.2	46.9	3.4	18.6	47.2	27.4	70	27.1	90	28.6
30	1356848	P	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	23.7	75	32	91	33.7
31	1234465	MA	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	26.1	81	26.6	80	28.5
32	1362187	RN	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	35.8	72	NR
33	908203	SK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	28.9	60	29.4	90	29.8
34	1120781	KK	2.2	2.3	106.7	2.7	2.6	84.1	2.9	4.3	84	3.1	5.6	84.7	3.8	10.4	41.4	4	11.9	44.1	30.7	63	29.3	72	26.9
35	1362260	ST	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	28.7	72	29.3	72	30.1
36	1368493	SG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	33.7	81	33.8	80	32.3
37	1376675	DS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	25.8	58	28.3	63	30.2
38	1300749	BK	3.7	3.9	63.3	3.7	3.1	61.7	3.8	4.3	66.2	3.7	3.6	63.3	3.9	15.1	44.8	4.1	14.7	48.4	29.8	63	30.7	81	30.1
39	1392153	SO	6.3	8.4	35.7	6	7.5	36	4.9	2.3	45.2	6.4	3.1	34.8	3.6	20.3	42	3.4	19.3	46.5	26.8	81	27.3	9	28.8
40	1397045	JS	4.2	6.3	51.1	4.2	6.7	56.5	4.2	5.3	57.1	4.3	5.3	59.9	4.5	10.4	33.1	4.7	9.8	33.3	32.6	72	31.8	100	31.7
41	1400544	IKJ	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	4	8.5	38	3.9	11.7	38.5	31	30	29.8	18	32
42	1403539	AM	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
43	1402573	MS	4.1	6.5	66.4	4.3	6.1	62.5	3.9	4.4	62.9	4.3	4.8	64.5	3.2	16	53.1	3.3	15.2	50.8	30.8	81	30.8	72	31.2
44	588464	BK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	31.1	66	NR	NR	NR
45	1406842	Kd	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	30.2	91	33.7	91	32.6
46	1407261	US	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	30.2	91	29.4	91	30.1
47	1407901	SS	4.6	7.2	53.7	4.5	6.8	53.7	4.6	4.7	54.9	4.3	3.7	51	3.3	15.5	45.8	3.3	15.1	47.6	23.9	91	25	91	26.8
48	1407266	Jd	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	34	91	33.4	91	34.3
49	384900	MK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	28.3	91	30.1	91	30.1
50	1233010	GS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	33.6	90	33.8	72	36.9
51	1358079	SG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	27.4	92	26.6	91	29.4
52	1413471	R	3.5	10.3	67.9	3.2	10	70.9	5.2	3.5	45.9	4.1	3.4	54.6	3.3	14.7	50	3.5	12.1	46.9	30	91	29.1	91	27.9
53	1388593	RA	4.5	4.8	49.5	5	3.2	42.2	NR	NR	NR	NR	NR	NR	2.8	35.9	55	2.8	36.3	60.6	25.2	100	28.3	58	25.3
54	1418169	KKG	5.8	4.7	39.8	8.4	3.8	26.4	5.9	4.2	27.5	5.5	4.2	39.8	3.6	14.6	41.4	3.8	14.8	38.7	27.3	91	27.2	91	28.1
55	408064	SCB	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	34.9	91	35.1	91	35.6
56	1401637	KS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	32.7	91	34	91	34.1
57	1424308	PK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	37.3	91	35	91	39.9
58	1328543	PK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	34.6	91	38	91	33.2
59	1409719	PD	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	33.7	91	35	91	32.1
60	1427869	KS	3.2	3.9	76.3	3.3	4.5	78.2	2.3	2.2	103.1	2	2.3	120.5	3.6	24.8	43.5	3.7	24.4	43.5	25	91	27	91	28.4
61	917363	RM	4.2	5.5	50.8	3.7	5.5	55.9	6.1	4.4	38.5	3.7	4.6	66.2	3.2	26.2	53.6	3.3	24.4	53.1	28.6	91	30.5	92	31.4
62	188653	UK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	4.1	5.4	40.3	4.4	5.1	37.7	30.8	91	30.2	91	30.1
63	1432647	SK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	32.6	91	30.7	91	35.6

S No.	MRD	Initials	Ulnar left fwave persistence	Ulnar right fwave latency	Ulnar right fwave persistence	Peroneal left fwave latency	Peroneal left fwave persistence	Peroneal right fwave latency	Peroneal right fwave persistence	Tibial left fwave latency	Tibial left fwave persistence	Tibial right fwave latency	Tibial right fwave persistence	IMPRESSION	Latency A1	Latency A2	Latency A3	Latency A4
1	1213056	SPS	100	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
2	1214202	MG	81	28.7	72	NR	NR	60.5	27	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	1320	1230	2180	2385
3	1251031	AK	91	38.6	83	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
4	1230127	NK	90	27.4	80	43	45	42.2	75	43.8	90	45.4	83	BILATERAL DISTAL MEDIAN NEUROPATHY	1530	1685	2035	2445
5	173673	SS	90	26.4	90	48.4	72	47.9	36	54.7	100	54.7	91	SENSORY POLYNEUROPATHY	NR	NR	NR	NR
6	173624	SL	91	25.1	91	42.5	66	44.8	54	46.6	100	43.5	90	BILATERAL DISTAL MEDIAN NEUROPATHY	995	1980	1980	1925
7	1257880	PS	91	32.5	91	57.1	91	51.3	91	56.6	91	57.9	91	BILATERAL DISTAL MEDIAN NEUROPATHY	1110	1010	2035	2235
8	1252386	JK	91	27.2	91	49.9	75	55.8	91	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
9	487199	VK	91	35.1	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
10	1230285	SG	91	30	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
11	1281880	IS	91	31.2	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
12	1279370	MK	91	25	91	45	91	44.7	91	50	91	49.2	91	NO ABNORMALITY DETECTED	700	905	1620	2100
13	1281736	DS	83	35.3	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
14	1232212	KS	91	35	91	NR	NR	NR	NR	59.2	91	58.9	91	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
15	1293508	BK	NR	NR	NR	66.8	16	68.2	16	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
16	1283186	HS	91	35.1	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
17	1007947	DS	75	36.2	54	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
18	1312688	UR	90	2.2	90	53.2	36	50.7	27	55.5	100	54.1	90	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
19	1314057	P	91	33.2	90	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
20	1315340	JS	90	29.5	92	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	1600	1630	2225	2530
21	1316307	SS	100	29.8	100	59.6	100	59.6	72	62.3	100	63.9	100	AXONAL SENSORIMOTOR POLYNEUROPATHY	1355	1450	2090	2320
22	1318198	DS	81	35.3	45	NR	NR	NR	NR	70.3	40	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	1475	1620	2380	2265
23	1323475	GS	100	29	90	52.6	27	59.2	18	57.3	100	59.9	100	BILATERAL L4-L5 RADICULOPATHY	880	1040	NR	NR
24	1327736	SS	90	34.9	90	59.3	91	NR	NR	59.9	91	56.8	91	RIGHT COMMON PERONEAL NEUROPATHY	1160	1050	1875	1830
25	1332774	HK	90	26.2	100	43.4	91	43.4	92	50	90	48.4	91	NO ABNORMALITY DETECTED	1190	1148	1890	1847
26	86714	JR	90	32.2	90	58.6	54	NR	NR	57.3	100	60.2	100	SENSORY POLYNEUROPATHY	NR	NR	NR	NR
27	1338744	VS	83	28.9	81	55	18	53.7	8	53.8	100	52.4	81	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
28	1339657	RK	83	35.3	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
29	1352800	PK	80	27.2	90	46.6	91	49	45	49.9	91	53.8	100	NO ABNORMALITY DETECTED	830	820	1575	1595
30	1356848	P	100	35.6	100	60	54	57.5	45	67.1	63	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
31	1234465	MA	90	29.4	90	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
32	1362187	RN	NR	37.9	90	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
33	908203	SK	81	32.7	90	55.9	63	57.4	36	66.4	100	57.1	27	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
34	1120781	KK	80	28.8	72	47.4	36	60.9	18	46.9	100	49.5	100	BILATERAL DISTAL MEDIAN NEUROPATHY	930	920	1678	1675
35	1362260	ST	63	31.1	90	NR	NR	NR	NR	53.5	90	54.6	100	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
36	1368493	SG	100	32.8	90	57.8	18	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
37	1376675	DS	90	32.4	83	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
38	1300749	BK	84	30.3	66	54.3	27	56.3	45	58.7	90	57.7	100	NO ABNORMALITY DETECTED	900	920	1775	1795
39	1392153	SO	90	27.7	50	52.3	45	48.6	90	50.3	100	48.9	100	NO ABNORMALITY DETECTED	1110	948	1930	2160
40	1397045	JS	100	32.4	72	73.9	63	61.8	33	69	100	69	100	NO ABNORMALITY DETECTED	1170	1150	2585	2915
41	1400544	IKJ	63	30.2	50	50	60	51.7	60	59.6	100	58.1	100	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
42	1403539	AM	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
43	1402573	MS	81	31.1	83	46.9	41	51.9	80	59.7	100	58.7	100	NO ABNORMALITY DETECTED	980	1345	1765	2260
44	588464	BK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
45	1406842	Kd	91	31.7	91	62.3	91	62.3	91	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
46	1407261	US	91	29.9	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
47	1407901	SS	92	24.5	91	43.3	83	40.6	83	45.3	91	43.9	91	BILATERAL DISTAL MEDIAN NEUROPATHY	1110	1245	1665	2100
48	1407266	Jd	91	35.9	91	55.6	83	53.7	91	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
49	384900	MK	91	26.1	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
50	1233010	GS	90	35.1	90	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
51	1358079	SG	91	24	91	50.3	91	53.9	91	65.5	91	70.8	91	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
52	1413471	R	91	27.3	91	51.8	91	53.7	91	55.6	91	56.7	91	BILATERAL DISTAL MEDIAN NEUROPATHY	910	940	1910	2140
53	1388593	RA	66	25	100	39.4	0	37.4	75	44.2	66	43.2	25	NO ABNORMALITY DETECTED	1080	1280	2800	2940
54	1418169	KKG	91	38.4	91	44.3	91	48.1	91	NR	NR	NR	NR	C8-T1 RADICULAPATHY	1000	1070	2060	2020
55	408064	SCB	91	37.1	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
56	1401637	KS	91	35	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
57	1424308	PK	91	40	91	80.3	66	72.1	91	NR	NR	NR	NR	DEMYELINATING SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
58	1328543	PK	91	35.2	91	61.1	91	59.8	91	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
59	1409719	PD	91	31.4	91	44.4	91	50.5	83	60.9	91	58.7	91	SENSORY POLYNEUROPATHY	1070	1200	2000	2210
60	1427869	KS	91	27.9	91	48.7	83	49.7	83	49.9	91	49.9	91	NO ABNORMALITY DETECTED	1235	1100	2105	2600
61	917363	RM	91	30.9	91	52.1	83	52.2	91	50.8	91	52.8	91	NO ABNORMALITY DETECTED	1025	1100	2100	2100
62	188653	UK	83	30.2	91	54.4	91	52.1	83	53.7	91	55	91	SENSORY POLYNEUROPATHY	1040	1380	2115	2390
63	1432647	SK	91	36.1	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR

S No.	MRD	Initials	Age	Gender	Duration of Diabetes	Fasting blood glucose	HbA1c	UACR	Ankle-Brachial Index	Vibration Perception Threshold	MNSI-A score	MNSI-B score	Fundoscopy findings	Median motor left distal latency	Median motor left proximal latency	Median motor left distal amplitude	Median motor left proximal amplitude	Median motor left velocity	Median motor right distal latency	Median motor right proximal latency	Median motor right distal amplitude	Median motor right proximal amplitude	Median motor right velocity	Ulnar motor left distal latency	Ulnar motor left proximal latency	Ulnar motor left distal amplitude
64	819808	SG	45	Female	7	141	9.4	30-300	0.7	20-25	9	5.5	Moderate NPDR	3.4	7.5	6.4	6.1	56.8	2.9	7	6.7	5.9	56.8	2.6	7	6.7
65	1435512	SC	42	Female	8	156	9.8	>300	0.9	>25	6	3	No DR	3.8	9.4	3.8	3.1	40.7	3.6	9.5	4	3.6	39	2.9	9.1	8
66	1438391	RS	71	Male	12	133	10.6	>300	0.6	>25	7	8	Mild NPDR	3.2	7.4	10.7	10.2	54.1	3	7.6	10.3	10	50.5	2.4	6.7	6.3
67	1437461	KS	76	Male	13	122	6.6	>300	0.9	>25	8	7	PDR	6	10.2	4.6	4.1	54.8	6.1	9.9	3.6	3	60.5	3	7.6	6.2
68	1440468	PS	53	Female	22	113	6.1	>300	1.3	>25	7	6	Mild NPDR	3.8	8.8	5.8	5.1	46	4.7	10.3	3.9	3.4	40.7	3.3	8.5	1.6
69	226801	VU	70	Female	25	157	8	>300	1	>25	7	7	PDR	5.6	9.7	6.4	5.6	56.8	3.7	8.2	6	5.2	50.5	3.2	7.4	8.9
70	1243787	HSG	66	Male	8	341	8	>300	0.5	>25	6	7	Mild NPDR	4.3	8.9	6.2	5.5	50	4.3	9.3	5.7	5.2	46	2.9	7.3	7.9
71	1348118	SS	67	Male	10	174	11.3	>300	1.4	>25	8	6	PDR	5.1	10	2.6	2.1	46.5	5.6	10.6	1.8	1.3	46	3.4	9.1	1.4
72	1447173	JK	56	Female	9	80	7	30-300	1.2	>25	7	4	No DR	3.9	7.8	6.3	5.7	58.2	4.1	8.6	5.2	4.9	51.1	2.7	7.4	5.6
73	1449480	GS	71	Male	8	122	7.9	>300	1.3	>25	6	5	No DR	3.9	8.4	5.5	5.2	51.1	3.9	8.3	5.1	4.9	52.3	2.8	7.1	5.5
74	324697	NK	65	Female	6	244	9.2	30-300	1	>25	6	4	No DR	4.5	8.6	5.6	4.8	55.4	4.8	9.9	1.1	0.7	45.5	3.1	7.8	4.1
75	1315620	SK	59	Female	9	247	7.2	30-300	0.9	15-20	4	4	No DR	3.5	7.2	9.3	8.4	62.2	3.6	7.3	8.5	8.3	62.2	2.2	6	11.5
76	1454637	MS	77	Male	5	178	9.5	>300	1.1	>25	8	6	Moderate NPDR	4	9.7	5.5	5	40	3.8	9.1	5.8	4.7	43.4	3.1	10.3	3.6
77	1455258	RK	55	Male	4	184	9.6	30-300	0.8	20-25	9	5.5	Mild NPDR	3.7	8.7	6.8	6.4	46	3.3	8.3	6.1	5.2	46	3	7.8	7.9
78	1453149	AL	64	Male	7	115	13.1	>300	1.2	>25	6	6	Moderate NPDR	4.1	9.2	5.7	5.5	49	4.6	10.3	5.5	4.9	43.9	3.5	9.4	2.7
79	1459685	HS	65	Male	13	159	8.8	>300	0.9	>25	6	5	Severe NPDR	3.2	7.9	5.8	5.3	53.8	3.1	7.8	9.4	8.6	53.8	3.1	7.4	9.1
80	1449739	SB	50	Female	2	208	12.2	>300	0.6	>25	7	5.5	No DR	3.3	7	5.8	4.9	62.2	3.4	7.5	5.5	4.4	56.1	2.1	5.9	7
81	1302859	M	58	Female	10	337	12.8	>300	1	>25	8	4.5	Moderate NPDR	3.4	7.6	5.5	5.1	55.4	3.5	8.4	5.6	5.2	46.9	3	7.2	2.6
82	1460756	RK	69	Male	13	229	6.9	30-300	1.2	>25	11	5	No DR	4.5	8.7	6.2	6	54.1	5.5	10.1	7.1	6.6	50	3.1	7.2	9.4
83	1451535	LS	55	Male	9	188	8.7	>300	1.4	>25	8	6	Mild NPDR	6.3	12.2	2.9	2.4	39	6.9	12.6	2.9	2.2	40	7.1	27.2	2.1
84	1461440	AJ	61	Male	7	240	6.2	30-300	1	20-25	5	6	No DR	3.6	8.7	5.4	4.6	45.1	4	8.6	5.3	5.2	50	2.7	7.3	6
85	1322917	P	52	Male	4	112	7.1	<30	0.9	20-25	5	4	No DR	3.4	8.9	6.1	5.3	41.8	3.6	8.6	5.9	5.2	46	2.8	7.5	3.4
86	1464382	KS	74	Male	5	217	8.2	30-300	1	>25	4	6	No DR	3.3	8.6	6.2	5.8	43.8	3.4	8.3	6.2	6	46.5	3.2	8.6	4.7
87	1233987	SLK	54	Male	8	134	8.5	>300	1.2	>25	2	6	No DR	3.3	9.3	8.2	7.6	46	4.2	9.2	7.3	6.8	46	3.3	8.1	6.6
88	1248814	RK	63	Male	10	88	11.9	>300	1.2	>25	4	6	Moderate NPDR	4.1	9.4	4.7	3.7	43.8	3.9	10.2	2.3	1.5	36.5	2.7	8.9	2.9
89	620213	BS	68	Male	5	242	10.1	>300	0.6	>25	6	7	Mild NPDR	3.8	8.2	2.3	2	52.3	3.6	8.2	3.4	3.2	50.5	3.4	8	3.3
90	1254323	JK	60	Male	7	186	12.8	>300	0.9	>25	3	8	No DR	3.9	8	9.1	8.5	56.1	3.2	8.2	8	7.8	46	2.4	7.4	10.8
91	756118	SS	68	Male	15	139	10.7	>300	0.8	>25	12	8	Severe NPDR	4.5	9.7	4.7	4.2	45.7	5	10	4.1	3.4	46	3.2	8.7	7
92	1321312	AKK	58	Male	9	145	9.4	30-300	0.9	>25	6	8	No DR	4	9.9	3.1	2.7	39	4.3	10.2	3.9	3.5	39	NR	NR	NR
93	1324513	SS	47	Male	6	154	13.5	<30	1	20-25	3	6	No DR	4.9	9.7	6.7	6.8	53.6	5.4	11.1	4.9	4.8	45.2	3.3	8.9	10.1
94	1325697	NR	65	Female	9	93	7.6	>300	1.2	>25	13	7	No DR	5.3	10.3	1.7	1.6	46.5	5.6	11.3	2	2	40.4	3.4	8.9	1.3
95	1201608	AM	65	Male	10	178	14.2	>300	0.7	>25	10	8	Mild NPDR	3.8	8.6	6.7	5.8	48.4	4.2	9.3	3.4	2.8	45.1	3	8.8	5.9
96	266645	PK	60	Male	6	249	6.3	30-300	0.9	20-25	10	5	No DR	4	9.2	5.3	4.7	43.8	5.3	10.5	5.6	5.2	44.2	3	8	6.6
97	1225829	DK	77	Male	15	240	9.4	>300	0.5	>25	6	6	Severe NPDR	4.4	11.5	3.7	3.6	33.8	4.2	9.4	5.7	4.3	46.2	3.2	8.9	5.8
98	1003958	AKG	74	Male	11	205	6	>300	1	>25	9	6	PDR	5.7	11.5	7.1	6.3	44.8	5.4	11.3	7.4	6.5	44.1	3.3	10.2	6.8
99	10095134	JS	65	Male	5	162	10.8	>300	1.1	>25	10	5	Moderate NPDR	4.3	10.6	3.8	3.4	36.5	4	11.2	2.4	1.6	31.7	3.4	9.6	2
100	328808	SS	45	Male	8	220	7.2	30-300	0.9	15-20	3	4	No DR	3.7	7.9	10	9.7	54.1	3	7.2	10.6	10.8	54.8	2.9	7.4	13
101	1326006	SKG	65	Male	10	154	6.6	>300	1.1	>25	10	8	Moderate NPDR	3.7	8.8	5	4.5	45.5	3.8	8.7	5	4.4	46.5	3.1	7.7	6.3
102	1488353	SB	54	Female	7	112	8.8	30-300	0.9	>25	6	6	Mild NPDR	4.9	8.7	6.6	6	59.7	4.2	8.4	4	3.7	54.8	3	7.5	6.2
103	360232	MS	69	Male	9	212	9.6	>300	0.6	>25	11	8	Severe NPDR	3.6	8.6	5.3	5	48	4	9.2	5	4.8	46.2	2.5	7.6	8.4
104	1483170	LK	43	Female	1	146	7.8	<30	1	<15	2	0	No DR	2.6	6.6	9.3	8.8	56.8	2.9	7	10.7	10.5	56.8	2.6	6.6	9.6
105	1484078	SKS	71	Male	5	256	11.6	>300	1.2	>25	8	6	Mild NPDR	5.2	9.9	6.1	5.3	48.4	5.4	13	1.1	1	30.5	3.1	7.9	7.5
106	1353129	JS	56	Male	6	171	8.5	>300	0.7	>25	10	8	Mild NPDR	5.7	10.8	6.3	6	45.1	5.3	11.1	4.9	4.6	40	3.4	8	6.9
107	1462877	SG	42	Male	5	134	9.2	30-300	1	20-25	2	0	No DR	3.8	8.4	10.3	10	50.5	3.6	8.1	9.8	9.1	51.1	3.3	8	8.1
108	1469996	RS	55	Female	3	190	8.6	30-300	1.1	15-20	4	0	No DR	3.1	7.1	5.5	5.5	57.5	3	7.2	5.6	5.6	54.8	2.3	6	8
109	1469491	SB	71	Male	12	106	7.1	>300	1.4	>25	8	8	Moderate NPDR	3.6	8.1	5	4.7	51.5	3.3	7.9	6.9	6	50	2.5	8.9	5.8
110	1159936	SK	70	Male	15	84	6.6	>300	1.2	>25	6	6	Severe NPDR	8.5	13.5	1.7	1.4	45.4	8.1	13.2	1.7	1.3	45.5	7.2	21.3	1.1
111	201859	KRM	81	Male	20	103	7.2	>300	1.4	>25	6	7	Moderate NPDR	5.3	10.3	4.3	3.5	46	5.5	10.5	4.2	3.2	46.5	3.1	7.9	6.4
112	614457	JRM	76	Male	15	189	9	>300	1.2	>25	6	6	Severe NPDR	4.1	9	4.8	4.7	46.9	3.8	9	6.5	5.9	44.2	2.6	8	6.8
113	102955	K	62	Female	4	156	7.9	30-300	1	>25	6	2	No DR	3.7	8.3	7.4	7.3	49.5	3.7	7.8	7.2	7	56.8	2.6	6.4	7.1
114	1498963	J	76	Male	13	133	6.4	>300	1.1	>25	8	6	Moderate NPDR	4.3	9.4	8	7.7	48.5	4.1	9.3	6.8	5.8	48.5	3.3	8.7	7.7
115	1500290	RL	57	Male	10	221	13.6	>300	0.6	>25	10	6	PDR	3.6	3.5	6.8	6.6	50.5	3.5	8.7	6	5	48.1	2.9	8.3	5.9
116	641864	O	69	Male	17	153	7.3	>300	1.3	>25	8	8	Severe NPDR	3.5	8.2	8.9	8.3	48.4	3.5	8.5	8.4	7.5	46.5	3.4	7.8	7.9
117	897055	SR	59	Female	5	300	14.5	>300	0.9	>25	9	3	Mild NPDR	3.6	8	1.7	1.2	52.3	3.7	8.3	2.7	2.2	50.5	NR	NR	NR
118	1466353	KL	66	Male	11	175	9.6	>300	1.1	>25	6	8	Moderate NPDR	5	10.2	2.9	2.7	44.7	9.3	15.5	1.3	1	37.1	3.4	9.6	5.6
119	1474441	DS	70	Male	12	193	10.3	>300	1.4	>25	5	9	Severe NPDR	5.2	10.4	7	6.1	48.1	4.9	10.8	5.6	5	42.4	3.4	10.1	9.4
120	1497845	SS	56	Male	13	211	7.9	>300	1.2	>25	10	6	Severe NPDR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	3.1	7.9	6.1
121	1473127	S	70	Female	9	121	8.9	30-300	0.8	>25	11	4	Mild NPDR	2.9	7	7.3	6.7	55.4	2.9	7.2	8.1	7.5	52.9	2.4	6.1	8
122	1493183	MS	78	Male	25	100	7.1	>300	0.7	>25	6	6	PDR	3.9	9.4	5.2	4.7	41.4	4.2	9.9	5.1	4.3	40.4	3.3	8.5	4.9
123	1487760	HS	56	Male	10	236	13.6	30-300	1.2	>25	10	8	Severe NPDR	5.2	10.9	0.9	0.8	40.4	5.8	11	0.6	0.3	44.2	3.3	7.7	2.1
124	303805	RL	71	Male	6	117	6.7	<30	1.1	>25	9	2	Mild NPDR	2.8	7.8	8.3	8.2	46.6	2.8	7.9	8.6	7.9	45.5	2.4	7.3	9.3
125	1470089	MR	63	Male	15	133	8.5	>300	0.6	>25	10	6	PDR		8.1	10.4	9.3	50.5	3.5	8.6	9.5	8.6	44.7	2.7	7.9	7

S No.	MRD	Initials	Ulnar motor left proximal amplitude	Ulnar motor left velocity	Ulnar motor right distal latency	Ulnar motor right proximal latency	Ulnar motor right distal amplitude	Ulnar motor right proximal amplitude	Ulnar motor right velocity	Peroneal motor left distal latency	Peroneal motor left proximal latency	Peroneal motor left distal amplitude	Peroneal motor left proximal amplitude	Peroneal motor left velocity	Peroneal motor right distal latency	Peroneal motor right proximal latency	Peroneal motor right distal amplitude	Peroneal motor right proximal amplitude	Peroneal motor right velocity	Tibial motor left distal latency	Tibial motor left proximal latency	Tibial motor left distal amplitude	Tibial motor left proximal amplitude	Tibial motor left velocity
64	819808	SG	6.4	54.5	2.3	7.1	7.3	6.6	50	3.5	11.6	4.9	4.6	36.8	3.3	11.5	5.2	4.8	36.8	3.2	10.4	9.6	8.5	44.8
65	1435512	SC	7.1	38.4	2.8	9.4	7.7	6.7	36.4	NR	NR	NR	NR	NR	3.6	15.3	1.5	0.9	25.6	4.5	15	2.2	1.6	30.3
66	1438391	RS	5.6	56.5	2.6	7.4	5.7	5.2	50.5	4.4	13.7	5.1	4.7	32.3	4.3	11.7	5	4.9	40.5	3.6	12.7	6.1	5.3	35.4
67	1437461	KS	5.3	52.2	2.7	7.5	6.1	5.3	50	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
68	1440468	PS	1.4	46.2	3.2	8.3	1.6	1	46.6	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
69	226801	VU	8.5	56.5	3.2	7.6	8.8	8.1	55.2	5.3	15.1	1.1	0.9	30.6	4.7	13.9	1.4	1.2	32.4	NR	NR	NR	NR	NR
70	1243787	HSG	7.5	54.5	2.9	7.3	8.3	7.8	55.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
71	1348118	SS	0.7	42.1	3.5	9.3	1	0.6	41.4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
72	1447173	JK	5	51.1	3.3	7.8	5.6	5.1	52.7	3.6	11.9	0.5	0.3	35.9	4.8	14.7	0.7	0.6	30.5	NR	NR	NR	NR	NR
73	1449480	GS	4.8	56.5	3.1	7.4	5.6	5	55.8	3.9	11	5.4	4.5	42.6	3.9	11.3	5.3	4.5	40.5	3.4	12.6	5.6	4.5	35
74	324697	NK	3.8	55.5	3.5	9.3	2.5	1.9	41.4	NR	4.4	NR	5	NR	NR	4.5	NR	4.4	NR	NR	NR	NR	NR	NR
75	1315620	SK	11.4	63.2	2.4	5.9	11.5	11.1	68.6	4	11	4.9	4.5	42.3	4.2	10.2	5.1	4.7	49.6	3.4	11.1	8.1	7	41.8
76	1454637	MS	3.5	33.3	3.3	9.6	3.6	3.4	37.8	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
77	1455258	RK	7.3	50	2.9	7.1	7.6	7.3	57.8	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	4.9	18.6	2.3	1.3	23.4
78	1453149	AL	2.2	43.7	3.2	9.9	0.7	0.6	38.8	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
79	1459685	HS	8.1	61.2	22.3	7.2	9	8.6	53.6	NR	NR	NR	NR	NR	5.4	16.7	3.4	3.1	31.1	4.6	15.7	1.1	0.8	33.3
80	1449739	SB	6.2	62.3	2.3	5.7	6	5.6	69.6	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
81	1302859	M	2.2	56.5	2.8	7.2	2.3	1.7	54.5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
82	1460756	RK	9	58.5	2.7	7	9.8	9.1	55.8	5.1	13	3.8	3.3	38	5.3	14.6	1	0.7	32.4	5.2	14.1	5.3	4.5	36
83	1451535	LS	1.4	12	6.7	26.7	2.3	1.5	12	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
84	1461440	AJ	5.1	52.2	2.6	7.4	6	5.1	50	5.1	13.8	1.6	0.6	34.3	4	14.6	0.7	0.6	28.3	NR	NR	NR	NR	NR
85	1322917	P	2.7	51.1	2.8	7.3	3.5	2.8	53.3	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
86	1464382	KS	3.8	44.9	2.6	9.3	5.6	4.7	35.8	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
87	1233987	SLK	6	50.5	3.3	7.9	3.8	3	52.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	5.1	16.1	4.7	4	32.9
88	1248814	RK	2.5	38.4	3	9	2.4	2.2	40.3	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
89	620213	BS	2.6	52.2	3.4	8.1	3.1	2.5	51.1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
90	1254323	JK	10.1	48	2.3	7.5	8.4	7.6	45.7	4.2	12.1	5.4	4.6	38	3.8	12.8	5.2	4.6	33.5	3.9	14.5	6.5	5.7	30.3
91	756118	SS	6.3	43.6	3.3	9	6.9	6.1	42.1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
92	1321312	AKK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
93	1324513	SS	9.7	48.2	3.2	8.5	8.4	8.2	50.5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
94	1325697	NR	0.7	44	3.5	9	2.1	1.5	43.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
95	1201608	AM	5.8	41	2.6	9.2	7.6	7	36.4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
96	266645	PK	6.2	48	2.9	7.3	6.4	5.2	53.9	NR	NR	NR	NR	NR	4.8	14.6	0.5	0.5	30.5	4.5	16	3.5	3.4	27.8
97	1225829	DK	5.5	43.9	3.1	9.2	6.5	5.9	41	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
98	1003958	AKG	6	38.8	3.4	9.8	6.9	6.4	42.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
99	10095134	JS	1.6	38.7	2.8	8.6	2.2	1.7	41	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
100	328808	SS	12.6	53.3	3	7.2	11	10.9	56.5	3.6	11.1	5.4	4.9	42.7	3.3	12.3	4.7	4.5	35.6	3.9	12.3	8.3	7.1	40.5
101	1326006	SKG	5.5	52.2	3	7.6	6.2	5.3	52.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
102	1488353	SB	5.4	52.7	2.8	7.2	6.3	5.5	54.5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	4.7	13.4	2.4	2	36.8
103	360232	MS	7.6	50.5	3	7.8	8.1	7.6	54.2	6	18.7	0.5	0.4	23.7	6.5	17.1	0.5	0.4	28.4	5.4	16.8	0.4	0.2	28.2
104	1483170	LK	9	59.3	2.4	6.8	11.6	11	54.5	3.6	10.8	4.5	4.3	41.4	3.6	11.1	5.2	4.7	40.3	4.3	11.6	9.9	9.3	43.5
105	1484078	SKS	7.2	50	2.8	7.4	8.1	7.2	52.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
106	1353129	JS	6.1	51.6	2.9	8.8	6.4	5.5	40.3	4.8	13.7	3.7	3.5	33.7	4.2	12.5	3.1	3.1	36.1	4.3	14.8	5.5	4.7	30.5
107	1462877	SG	7	51.6	2.9	7.7	10.6	9.6	49.5	3.6	11.9	5.2	4.4	35.9	3.4	11.8	5.4	5.1	35.7	4.1	13.4	7	6.5	34.2
108	1469996	RS	7.3	64.9	2	6.2	8.8	8	57.8	3.3	9.8	7.8	7.6	46.2	2.8	9.7	6.4	5.5	43.2	3.2	10.3	7.1	6.3	45.1
109	1469491	SB	5.1	37.5	2.7	10.4	5.5	5.3	31.4	4.1	12.5	1.1	1	35.9	3.6	12.7	2.2	1.4	33.1	NR	NR	NR	NR	NR
110	1159936	SK	0.8	17	5.7	16.9	1.2	0.7	22.4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
111	201859	KRM	5.9	50	3.1	8.9	6.5	5.6	41.7	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
112	614457	JRM	6.3	44.4	2.3	8.4	6.1	5.8	39	3.6	16.5	0.5	0.4	23.2	4.2	15	1.1	0.8	27.9	5.9	16.8	0.7	0.3	29.4
113	102955	K	6.6	64	2.7	6.3	7.5	6.8	65.8	4.1	12.3	2	1.4	36.4	4	13.5	2	1.6	31.7	4.2	14.7	3.5	2.8	30.6
114	1498963	J	6.7	44.4	3.1	8.3	7.6	7.4	45.7	4.7	14.5	3	2.7	35.7	4.2	16.1	3.1	2.3	29.5	4.2	17.3	3.8	2.6	28.4
115	1500290	RL	5	47.7	2.9	7.5	5.6	4.5	56.5	4.9	15.1	1.7	1.3	33.5	4.5	15	1.4	1.1	32.3	4.4	15.6	2.3	1.6	32.1
116	641864	O	7.3	54.4	3.5	8.2	7.4	6.6	50.5	5.2	17	0.3	0.1	25.3	4.9	16.8	0.4	0.3	25.3	4.7	15.5	4.3	3.9	29.5
117	897055	SR	NR	NR	2.8	7.5	2.3	2.1	51.1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
118	1466353	KL	5.2	43.6	3.3	9.1	5.6	5.3	41.4	4.9	14.6	1.6	1.3	31.1	4.4	13.7	1.6	1.3	32.3	NR	NR	NR	NR	NR
119	1474441	DS	8.6	38.8	3.5	9.2	9.9	9.4	45.2	4.1	14.8	3.3	3	31.8	4	14.8	1.5	1.3	31.5	4.6	15.4	1.1	0.6	33.2
120	1497845	SS	5.4	50.5	3.2	7.9	6.5	5.8	51.6	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
121	1473127	S	7.8	64.9	2.5	7	8.1	7.5	53.3	3.9	12.1	2.4	1.8	36.8	3.8	13	1.6	1.1	32.8	3.9	13	6.4	6.2	35.2
122	1493183	MS	4.1	46.2	4.4	9	0.9	0.5	52.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
123	1487760	HS	1.7	53.9	3.4	7.7	2.1	1.7	55.8	NR	NR	NR	NR	NR	5.2	15.3	1	0.6	29.7	5.7	17.6	3.2	2.4	26.9
124	303805	RL	8.6	48.5	2.8	7.3	9.1	8.2	54.5	4.5	15.6	4.2	3.6	30.6	4.5	15.9	4	3.6	26.2	5.4	16.8	2.8	2.1	28.2
125	1470089	MR	6	46.2	2.6	8.2	8	7	42.9	3.4	12.4	2.5	1.9	33.3	4.7	13.6	2.6	2.4	33.3	4.1	14.4	2.2	1.8	31.2

S No.	MRD	Initials	Tibial motor right distal latency	Tibial motor right proximal latency	Tibial motor right distal amplitude	Tibial motor right proximal amplitude	Tibial motor right velocity	Femoral motor left latency	Femoral motor left amplitude	Femoral motor left velocity	Femoral motor right latency	Femoral motor right amplitude	Femoral motor right velocity	Medial planter motor left latency	Medial planter motor left amplitude	Medial planter motor left velocity	Medial planter motor right latency	Medial planter motor right amplitude	Medial planter motor right velocity	Lateral planter motor left latency	Lateral planter motor left amplitude	Lateral planter motor left velocity	Lateral planter motor right latency	Lateral planter motor right amplitude	Lateral planter motor right velocity	Median sensory left latency
64	819808	SG	3.9	10.8	9.4	8.2	46	3.7	3.4	49.2	3.7	3.6	45.9	3.4	10.2	35.1	4.2	10.5	28.8	4.1	10.9	33.8	4.1	10.6	33.8	3.3
65	1435512	SC	5.6	15.5	4.3	3.9	32.3	4.7	3.5	38.7	4.7	3.5	38.7	4.1	3.5	29.2	4.3	3.5	28	4.3	0.5	32.6	5.3	0.8	26.7	NR
66	1438391	RS	3.5	12.6	6.4	5.8	35	4.1	4.7	36	4.5	4.3	42	4.1	5.4	29.6	3.9	5.5	31	4	6	34.8	3	5.9	46.7	3.4
67	1437461	KS	NR	NR	NR	NR	NR	3.9	3.2	39.5	4.3	3.1	39.5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
68	1440468	PS	NR	NR	NR	NR	NR	4.8	2.6	37.9	4.7	2.6	38.7	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
69	226801	VU	NR	NR	NR	NR	NR	4.8	2.7	35.8	4.4	2.9	38.6	8	2	15.1	8	2	14.4	6.6	1	21.1	7.3	0.9	19.3	5.8
70	1243787	HSG	NR	NR	NR	NR	NR	3.4	3.2	44.1	3.6	3.8	42.4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	4.4
71	1348118	SS	NR	NR	NR	NR	NR	4.5	2.1	34	4.7	2.2	31.8	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
72	1447173	JK	NR	NR	NR	NR	NR	4.1	2.6	41.5	3.9	2.6	43.6	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	4.6
73	1449480	GS	3.5	12.8	5.6	4.8	34.2	5.3	3.7	34.3	4.1	3.9	44.4	4.3	8.8	27.8	3.8	9.6	32	4.6	4.8	30.5	4.2	4.7	33.3	3.2
74	324697	NK	NR	NR	NR	NR	NR	3.9	2.5	43.6	3.6	2.6	47.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
75	1315620	SK	3.9	11.5	7.1	6.7	42.1	2.9	4	61.9	2.8	4	63.8	4.6	6.1	26.3	5	6.1	23.8	5	7.3	27.8	5.1	6.9	27.3	2.7
76	1454637	MS	NR	NR	NR	NR	NR	4.9	4.1	37.1	4.9	3.6	36.7	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
77	1455258	RK	4.7	17.9	1.5	0.9	24.2	5.2	3	35	5.2	3.1	35	7.1	0.9	17	5.2	1.2	23	6.2	0.6	22.4	6.2	0.8	22.7	3.8
78	1453149	AL	NR	NR	NR	NR	NR	4	7.4	43	4.5	6.4	38.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
79	1459685	HS	5.7	17.5	1.7	1.2	31.5	3.3	6.4	55.4	3.7	7.1	48.6	5.5	1.8	21.7	7.4	1.3	16.1	5.2	0.9	26.8	5.6	2.2	25.2	3.2
80	1449739	SB	NR	NR	NR	NR	NR	3.7	3.9	45.9	3.6	4.2	47.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	2.7
81	1302859	M	NR	NR	NR	NR	NR	3.2	4.9	49.4	3.4	3.8	56.7	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	4.5
82	1460756	RK	5.3	14.6	4.6	4.2	34.2	4.9	5	38.3	4.7	5.4	37.1	6.6	6.3	18.1	6.7	6.4	18	6.4	2.7	21.9	6.2	2.4	22.5	4.4
83	1451535	LS	NR	NR	NR	NR	NR	7.1	5.5	31	6.8	5.1	32.4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
84	1461440	AJ	NR	NR	NR	NR	NR	5.1	7.3	45.1	5.2	7.5	44.7	7.5	0.6	16.1	7.3	0.7	16.5	6	0.4	23.3	5.9	0.5	23.6	3.6
85	1322917	P	NR	NR	NR	NR	NR	3.4	3.8	55.9	3.2	3.4	58.5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
86	1464382	KS	NR	NR	NR	NR	NR	4.6	1.3	49.4	4.5	3.4	56.7	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	3.9
87	1233987	SLK	5.8	16.8	5.7	5.7	32.7	4.7	10.6	48.2	4.6	10.5	46.4	5	4.2	24.2	4.9	4.2	24.7	7.8	3.1	18.1	7.7	3	18.2	3.7
88	1248814	RK	NR	NR	NR	NR	NR	2.8	3.9	59.6	2.75	4.6	61.8	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
89	620213	BS	NR	NR	NR	NR	NR	2.7	2.8	59.3	2.8	2.5	57	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
90	1254323	JK	3.6	14.2	6.1	5.4	30.2	4	2.5	44.4	3.8	2	46.9	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	3.6
91	756118	SS	NR	NR	NR	NR	NR	2.8	3.5	57	2.9	4.6	55.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
92	1321312	AKK	NR	NR	NR	NR	NR	4	3.9	46.9	3.8	3.1	49.4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
93	1324513	SS	NR	NR	NR	NR	NR	3.6	3.7	54.9	3.6	3.7	58.5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	5.4
94	1325697	NR	NR	NR	NR	NR	NR	3.8	3	44.4	3.9	2.7	47.1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
95	1201608	AM	NR	NR	NR	NR	NR	4.8	2.6	36.9	4.7	2.6	38.7	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	4
96	266645	PK	5.8	16.1	4.2	3.5	30.9	4.8	2.7	35.8	4.4	2.6	37.6	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	4
97	1225829	DK	NR	NR	NR	NR	NR	3.4	3.2	44.1	3.6	3.8	42.4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
98	1003958	AKG	NR	NR	NR	NR	NR	4.5	2.1	34	4.7	2.2	31.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	5.4
99	10095134	JS	NR	NR	NR	NR	NR	4.1	2.6	41.5	3.9	2.6	46.6	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
100	328808	SS	3.8	12.3	9.5	8.8	39.8	5.5	3.7	34.3	4.1	3.9	44.4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	3.5
101	1326006	SKG	NR	NR	NR	NR	NR	7	2	32.4	6.5	2.3	34.2	8.2	0.4	14.7	7.2	0.5	16.7	NR	NR	NR	NR	NR	NR	4.8
102	1488353	SB	4.1	13.2	1.4	1.2	35.4	4.7	5.5	40.4	4.6	5.6	41.8	4.1	1.8	29.3	4.4	1.8	27.6	4.6	0.8	30.8	4.5	0.8	31.5	NR
103	360232	MS	4.1	16.3	0.6	0.1	26.2	4.7	2.4	48.2	4.5	2.7	46.4	7.7	0.8	15.7	7.1	0.7	17	NR	NR	NR	NR	NR	NR	4.1
104	1483170	LK	4.5	12	8.8	8	42.7	2.3	6.1	68	2.6	6.5	63	2.8	10.1	42.9	3	11.1	40	4.4	8.1	32.2	4.4	8.2	32.2	3.1
105	1484078	SKS	5.7	17.1	0.7	0.3	28.1	5.4	5.6	43.2	4.9	6.5	40.4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	4.6
106	1353129	JS	4.4	14.8	4.7	4	30.9	4.4	4.4	49	4.6	4.5	46	3.5	3	34.3	3.9	3	30.8	5.5	0.9	25.5	4.8	0.9	29.2	5.2
107	1462877	SG	4	12.9	7.1	6.1	36	4.1	4.7	36	4.5	4.3	42	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	3.9
108	1469996	RS	3.3	10.3	8	7.5	45.5	4.1	6.5	65	4.4	6.5	46	4.5	7.9	26.8	4	7.5	30.1	4.8	3.1	29	6.1	2.6	23.1	2.9
109	1469491	SB	NR	NR	NR	NR	NR	3	0.5	60.1	3.5	0.5	62.3	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	3.6
110	1159936	SK	NR	NR	NR	NR	NR	5.7	3.2	32.1	5.5	3.7	33.6	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
111	201859	KRM	NR	NR	NR	NR	NR	4.7	5.5	40.4	4.6	5.6	41.8	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
112	614457	JRM	2.9	14.3	1	0.7	28.1	4.2	4.4	42.1	4.5	4.5	47.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	4.1
113	102955	K	3.9	14	3.5	2.8	31.7	4.4	11.9	49.2	4.6	11.8	41.1	3.6	9.6	33.6	3.6	9.3	33.3	6.3	4.8	22.3	6.1	4.9	23.1	3.3
114	1498963	J	4.5	14.9	4.4	3.8	35.4	4.7	10.6	48.2	4.6	10.5	46.4	5	4.2	24.2	4.9	4.2	24.7	7.8	3.1	18.1	7.7	3	18.2	NR
115	1500290	RL	4.3	16	2.1	1.6	30.6	4.7	5.5	40.4	4.6	5.6	41.8	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	3.3
116	641864	O	4.4	14.2	5.3	4.5	33	3.7	3.4	49.2	3.7	3.6	45.9	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	4
117	897055	SR	NR	NR	NR	NR	NR	5.3	3.7	34.3	4.1	3.9	44.4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
118	1466353	KL	5.8	15.7	2.4	1.9	32.3	4	4.7	53.9	4.3	5.5	41.8	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
119	1474441	DS	4.5	15.3	0.7	0.3	33.3	6.9	4.3	31.9	6.2	4.2	35.8	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	5.2
120	1497845	SS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
121	1473127	S	3.4	12.6	5.6	4.8	34.8	4.1	3.1	51.2	4.4	3.2	47.7	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	3.3
122	1493183	MS	NR	NR	NR	NR	NR	3.2	2.5	57.1	3.2	2.8	54	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	3.5
123	1487760	HS	4.7	16.3	2.6	1.6	27.7	4.9	2.9	45.4	5.4	3.1	41.1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
124	303805	RL	5.5	16.8	2.6	2	28.4	4.2	4.4	42.1	4.5	4.5	47.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	3
125	1470089	MR	4	14.9	2.3	1.5	29.2	4.8	2.6	36.9	4.7	2.6	38.7	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	3.7

S No.	MRD	Initials	Median sensory left amplitude	Median sensory left velocity	Median sensory right latency	Median sensory right amplitude	Median sensory right velocity	Ulnar sensory left latency	Ulnar sensory left amplitude	Ulnar sensory left velocity	Ulnar sensory right latency	Ulnar sensory right amplitude	Ulnar sensory right velocity	Saphenous sensory left latency	Saphenous sensory left amplitude	Saphenous sensory left velocity	Saphenous sensory right latency	Saphenous sensory right amplitude	Saphenous sensory right velocity	Sural sensory left latency	Sural sensory left amplitude	Sural sensory left velocity	Sural sensory right latency	Sural sensory right amplitude	Sural sensory right velocity
64	819808	SG	22.7	65.4	2.8	18.6	69.3	2.8	20.7	69.3	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
65	1435512	SC	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
66	1438391	RS	20	57.9	3.4	18.2	55.1	3	24	80.5	2.8	20.9	66	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
67	1437461	KS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
68	1440468	PS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
69	226801	VU	11.4	32	4.8	22.2	40.2	3.8	25.2	49.3	3.9	24.5	49.3	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
70	1243787	HSG	16.2	44.3	4.4	14.3	41.9	3.2	11.4	61.4	3.1	12.5	65.4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
71	1348118	SS	NR	NR	NR	NRN	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
72	1447173	JK	16.7	40.5	4.6	15.3	39.5	3.5	19.5	57.9	3.5	19.8	53	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
73	1449480	GS	22.6	60.3	3.2	22.6	56.9	3	25.5	65.4	2.9	25.9	64.8	4	8.8	46.7	3.9	10.4	49.3	3.2	14.9	63.1	3.4	14.1	60.3
74	324697	NK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
75	1315620	SK	73	63.8	2.7	74	68	2.5	58.2	70	3.1	52.6	56	3.3	9.2	51.5	3.3	10	52	3.1	50.4	55.1	2.8	55.4	61.9
76	1454637	MS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
77	1455258	RK	18.1	54.3	3.9	12.4	46.7	3.6	20.9	54.3	4	8.2	44.3	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
78	1453149	AL	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
79	1459685	HS	21.2	55.6	3	19.8	60.9	2.9	18.5	62.5	2.8	17.9	66.7	NR	NR	NR	NR	NR	NR	5.2	11.3	35	4.1	8.4	46.1
80	1449739	SB	23	70	2.7	20.8	66	2.6	21	70	2.7	22.1	69.3	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
81	1302859	M	29.9	44	4.2	27.1	48.6	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
82	1460756	RK	24	39.5	5.9	14.6	35.5	3.9	14.6	48.3	3.7	14.1	48.6	5.4	7.6	35	5.1	7.3	34.8	4.6	14.1	38.9	4.1	12.6	49.3
83	1451535	LS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
84	1461440	AJ	16.6	55.1	3.7	17.8	52.6	3.1	7.1	57.4	3.2	7.5	58.3	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
85	1322917	P	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
86	1464382	KS	9.2	44.9	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
87	1233987	SLK	12	49	4.2	14.9	43.2	3.3	7	48.3	3.5	9.4	56.9	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
88	1248814	RK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
89	620213	BS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
90	1254323	JK	30.2	49.6	3.4	32.6	55.6	2.9	18	56.9	3	18.2	61.4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
91	756118	SS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
92	1321312	AKK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
93	1324513	SS	4.7	33.8	NR	NR	NR	3.3	5.2	51.9	3.4	7.3	55.1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
94	1325697	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
95	1201608	AM	10.1	47.9	4.4	9.5	44.9	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
96	266645	PK	9	47.3	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
97	1225829	DK	NR	NR	4.5	6.3	38.5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
98	1003958	AKG	12.9	33.5	5.1	13.6	37.4	4.4	9.9	41.7	4.5	7	39.8	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
99	10095134	JS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
100	328808	SS	30.2	50.7	3.4	22.2	54.3	3.5	28.3	56.5	3.4	27.1	55.6	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
101	1326006	SKG	11.4	39.5	4.5	12.4	47	2.9	5.9	82.4	3.7	8.3	52.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
102	1488353	SB	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
103	360232	MS	20.1	44.9	4.4	14.6	39.3	3.2	9.8	58.8	3.3	9.3	59.3	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
104	1483170	LK	35.8	60.9	3	38.2	58.8	3.1	39.7	59.3	3.1	39.2	58.3	3.7	16.2	50	3.6	15.4	51	3.2	20.7	56.9	3.1	19	57.4
105	1484078	SKS	11.1	44.9	NR	NR	NR	3.2	4.9	57.9	3.1	5.6	59.3	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
106	1353129	JS	15.9	33	5.4	13.3	32.9	3.5	18	53.4	3.4	15	50.4	3.5	10.8	54	3.6	9.6	52	3.5	11.2	50.7	3.5	11.7	55.6
107	1462877	SG	7.7	47	4	8.5	42.9	3.4	13.6	55.1	3.4	14.8	55.1	4.2	4.5	41.4	3.8	4.4	39.4	4.1	6	46.1	3	3.5	62.5
108	1469996	RS	70.8	62.5	2.7	73.4	67.3	2.6	41.4	70.7	2.6	42.2	72.2	3.1	17	36.1	3	18.2	38.3	2.7	28.6	64.8	2.7	27.7	65.4
109	1469491	SB	14.8	53	3.5	18.3	53.8	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
110	1159936	SK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
111	201859	KRM	NR	NR	NR	NR	NR	3.4	12.4	55.6	3.6	12.3	53.8	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
112	614457	JRM	19.2	14.4	3.9	19.2	45.5	3.2	10.1	54.7	3.4	9.2	55.1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
113	102955	K	27.5	50.7	3.1	30.1	57.4	2.9	29.3	68	2.8	25.3	68.6	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
114	1498963	J	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
115	1500290	RL	16.1	57.4	3.1	19.4	68	3	11.6	74.5	3.1	12.3	69.3	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
116	641864	O	14.5	49	3.9	14.1	44.3	3.7	14.1	47.9	3.9	16.8	49.6	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
117	897055	SR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
118	1466353	KL	NR	NR	NR	NR	NR	3.3	14.7	51.5	3.4	13.5	53.8	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
119	1474441	DS	17.5	35.4	5.1	18.2	42.9	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
120	1497845	SS	NR	NR	NR	NR	NR	3.2	3.6	51.5	3.1	2.7	52.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
121	1473127	S	26.2	56.5	3.3	20.7	56	2.9	21.6	64.8	2.9	18.4	64.8	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
122	1493183	MS	14.8	52.6	4	8.3	45.5	3.9	4.7	46.1	3.8	3.6	45.5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
123	1487760	HS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
124	303805	RL	22.2	60.3	2.9	23	62.5	2.7	17.3	75.3	2.6	14.4	73.7	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
125	1470089	MR	9	45.8	3.5	5.8	48.3	3.2	5	63.1	3.3	6.3	61.4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

S No.	MRD	Initials	Medial planter sensory left latency	Medial planter sensory left amplitude	Medial planter sensory left velocity	Medial planter sensory right latency	Medial planter sensory right amplitude	Medial planter sensory right velocity	Lateral planter sensory left latency	Lateral planter sensory left amplitude	Lateral planter sensory left velocity	Lateral planter sensory right latency	Lateral planter sensory right amplitude	Lateral planter sensory right velocity	Supeficial peroneal sensory left latency	Supeficial peroneal sensory left amplitude	Supeficial peroneal sensory left velocity	Supeficial peroneal sensory right latency	Supeficial peroneal sensory right amplitude	Superficial peroneal sensory right velocity	Median left fwave latency	Median left fwave persistence	Median right fwave latency	Median right fwave persistence	Ulnar left fwave latency
64	819808	SG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	25.1	91	24.7	91	29.7
65	1435512	SC	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	32.8	72	36.3	81	34.3
66	1438391	RS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	26.4	91	28.7	91	30.1
67	1437461	KS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	32.1	91	34.3	91	30
68	1440468	PS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	34.5	91	35.1	91	35
69	226801	VU	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	32.5	91	32.3	91	34.7
70	1243787	HSG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	30	91	30.1	91	30.1
71	1348118	SS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	38.3	91	36.6	91	38
72	1447173	JK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	27.7	83	27.7	90	29
73	1449480	GS	4.3	2.5	59.7	4.5	2.6	52.3	4.3	3.6	64.7	4.2	4.9	59.5	3.9	12.9	42.9	3.7	12.6	44.8	30.3	91	29	91	29.6
74	324697	NK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
75	1315620	SK	3.9	6.1	54.1	3.6	6.8	59.2	3.8	5.1	60.6	3.9	6.6	58.5	2.7	58.1	57.1	3.1	52.7	46.9	26.8	91	28.5	91	26.1
76	1454637	MS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	35.6	91	35.7	91	38.3
77	1455258	RK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	31.3	91	32.6	91	34.4
78	1453149	AL	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	29.9	81	35.5	90	35.7
79	1459685	HS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	27.1	90	27.9	81	27.5
80	1449739	SB	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	24.4	91	25	91	25
81	1302859	M	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	25	91	30.1	91	28.9
82	1460756	RK	4.1	3.1	53.7	3.5	3.2	63.8	7.9	4.2	30.3	6	4	37.5	5	8.8	32.4	NR	NR	NR	30.1	91	29.9	91	30.1
83	1451535	LS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	38.1	91	44.1	91	NR
84	1461440	AJ	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	30.1	91	34.1	91	32
85	1322917	P	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	30.5	63	30.8	81	29
86	1464382	KS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	30.6	91	32.5	91	36.2
87	1233987	SLK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	31.9	90	31.9	90	34.5
88	1248814	RK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	34.9	83	33.1	84	39.5
89	620213	BS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	27.9	91	28.1	91	30.1
90	1254323	JK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	29.2	91	28.8	91	30.1
91	756118	SS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	30.6	91	31	91	31.4
92	1321312	AKK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	35.2	72	35.3	63	NR
93	1324513	SS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	35.2	90	35.7	72	34.2
94	1325697	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
95	1201608	AM	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	30.4	90	30.9	81	34
96	266645	PK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	32.2	63	34	9	NR
97	1225829	DK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	31.2	81	30.3	81	30.6
98	1003958	AKG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	36.3	100	36.3	90	34.1
99	10095134	JS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	34.9	90	35	91	35.2
100	328808	SS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	25.5	90	26.6	81	27.7
101	1326006	SKG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	32.9	91	35	91	33.1
102	1488353	SB	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	29	90	29	75	27.9
103	360232	MS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	35	91	32.6	91	35
104	1483170	LK	3.6	8.2	76.6	3.4	7.1	69.3	3.4	5.6	69.9	3.5	7.1	73	3	23.3	50.8	3.1	25	50.4	24.3	72	24.9	81	26.1
105	1484078	SKS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	33	92	28.6	91	30.9
106	1353129	JS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	3.4	10.7	42.3	3.6	13.1	42.9	35.4	83	34.4	78	32.5
107	1462877	SG	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	27.3	83	28	90	32
108	1469996	RS	4.1	6.5	66.4	4.3	6.1	62.5	3.9	4.4	62.9	4.3	4.8	64.5	3.2	16	53.1	3.3	15.2	50.8	25.1	75	26.7	81	26.1
109	1469491	SB	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	29.5	76	29	81	30.3
110	1159936	SK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
111	201859	KRM	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	36.8	91	36.3	91	35.4
112	614457	JRM	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	30.4	81	33	90	30.7
113	102955	K	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	26.6	91	27.4	91	25
114	1498963	J	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	33.2	91	32.6	91	35
115	1500290	RL	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	31.7	90	31	63	33
116	641864	O	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	32.5	91	35	91	35
117	897055	SR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	29.9	63	27.6
118	1466353	KL	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	29.3	80	44.5	63	34.5
119	1474441	DS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	34.9	75	33.4	72	35.7
120	1497845	SS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	34.3
121	1473127	S	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	25.1	83	26.3	81	26.8
122	1493183	MS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	33.7	90	35.1	63	33.3
123	1487760	HS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
124	303805	RL	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	31	70	29	80	30.2
125	1470089	MR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	29.9	63	32	64	34.8

S No.	MRD	Initials	Ulnar left fwave persistence	Ulnar right fwave latency	Ulnar right fwave persistence	Peroneal left fwave latency	Peroneal left fwave persistence	Peroneal right fwave latency	Peroneal right fwave persistence	Tibial left fwave latency	Tibial left fwave persistence	Tibial right fwave latency	Tibial right fwave persistence	IMPRESSION	Latency A1	Latency A2	Latency A3	Latency A4
64	819808	SG	91	45.8	91	43	91	47.5	91	47.7	91	NR	NR	SENSORY POLYNEUROPATHY	1160	1280	2250	2200
65	1435512	SC	81	34.6	72	NR	NR	70	54	64.8	72	61.2	81	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
66	1438391	RS	91	29.9	91	50	91	48.8	91	50.4	91	52.6	91	SENSORY POLYNEUROPATHY	1150	1060	2620	3250
67	1437461	KS	91	30.1	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
68	1440468	PS	91	35.2	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
69	226801	VU	91	34.3	91	58.1	91	58.1	91	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
70	1243787	HSG	91	28.9	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
71	1348118	SS	91	38	83	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
72	1447173	JK	90	29.1	90	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
73	1449480	GS	91	29.2	91	48.1	91	46.4	91	52.6	91	50.4	91	NO ABNORMALITY DETECTED	740	900	1920	1830
74	324697	NK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
75	1315620	SK	91	25.1	91	49.9	91	50	91	52.2	91	50.1	91	NO ABNORMALITY DETECTED	780	1080	1970	1890
76	1454637	MS	91	40.9	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
77	1455258	RK	91	34.3	91	NR	NR	NR	NR	66.8	91	58	91	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
78	1453149	AL	72	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
79	1459685	HS	72	27.6	90	NR	NR	58	27	63.9	91	59.2	90	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
80	1449739	SB	91	23.9	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
81	1302859	M	91	28.8	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
82	1460756	RK	91	30.1	91	55.4	92	45.5	83	55.4	91	62	91	RIGHT COMMON PERONEAL NEUROPATHY	1025	1100	2100	2100
83	1451535	LS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	DEMYELINATING SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
84	1461440	AJ	91	35.1	91	57.8	83	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
85	1322917	P	100	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
86	1464382	KS	91	34.4	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
87	1233987	SLK	100	33.3	90	62.9	100	62.7	100	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
88	1248814	RK	83	36.7	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
89	620213	BS	91	35.1	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
90	1254323	JK	91	29.9	91	39.3	66	54.4	75	53.8	100	51.7	91	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
91	756118	SS	92	32.1	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
92	1321312	AKK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
93	1324513	SS	27	34.6	81	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
94	1325697	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
95	1201608	AM	72	32.8	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
96	266645	PK	NR	30.2	45	58.2	72	60.2	90		NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
97	1225829	DK	81	28.7	72	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
98	1003958	AKG	100	36.8	81	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
99	10095134	JS	81	35.9	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
100	328808	SS	100	27.6	100	45	100	48	90	46.8	100	47.6	100	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
101	1326006	SKG	91	34.5	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
102	1488353	SB	100	27.8	100	51.6	100	49.5	90	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
103	360232	MS	91	35	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
104	1483170	LK	81	25.6	90	46.2	27	44.5	63	44.9	81	45.1	100	NO ABNORMALITY DETECTED	1265	1575	2090	2505
105	1484078	SKS	91	33.1	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
106	1353129	JS	72	33.8	81	54.7	27	54.2	72	56.8	100	56.6	100	NO ABNORMALITY DETECTED	NR	NR	NR	NR
107	1462877	SG	81	30	91	48.9	72	49	90	55.5	90	56.6	81	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
108	1469996	RS	81	25.2	90	61.6	27	41.2	27	47.8	90	46	100	NO ABNORMALITY DETECTED	1060	1380	2900	2840
109	1469491	SB	90	33.7	81	52.2	27	53	60	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
110	1159936	SK	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	DEMYELINATING SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
111	201859	KRM	91	35.1	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
112	614457	JRM	90	31.1	90	33	90	66.3	91	64.6	91	64.2	91	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
113	102955	K	91	25.1	91	46.5	91	48.1	91	53	93	49.8	91	SENSORY POLYNEUROPATHY	NR	NR	NR	NR
114	1498963	J	91	34.9	92	54.4	91	59.8	91	62.8	92	60.3	92	SENSORY POLYNEUROPATHY	NR	NR	NR	NR
115	1500290	RL	81	32.2	100	56	58	57.6	50	60.7	81	59.9	81	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
116	641864	O	91	34	91	62.4	91	62.5	91	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
117	897055	SR	58	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
118	1466353	KL	63	23.7	100	61.6	27	49	81	NR	NR	63.6	81	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
119	1474441	DS	81	31.4	91	64.7	82	59.9	58	72.8	76	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
120	1497845	SS	91	34.3	91	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
121	1473127	S	81	26.5	90	49.7	45	53.2	58	53.7	100	52.3	100	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
122	1493183	MS	81	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
123	1487760	HS	NR	NR	NR	NR	NR	NR	NR	54.9	100	61	90	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
124	303805	RL	70	29.5	81	50.4	40	62.6	45	60.8	81	59.3	81	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR
125	1470089	MR	90	33.4	90	55.2	54	52.6	72	64	100	65.3	81	AXONAL SENSORIMOTOR POLYNEUROPATHY	NR	NR	NR	NR

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The Principal,
DMC, Ludhiana.

Subject: **Approval of Plan of Thesis.**

This is to inform you that the Faculty of Medical Sciences in its meeting held on 29.10.2021 has approved the plan of thesis of **Rajat Gupta**, a student of your college for **DM Neurology** along with the names of Supervisor/Co-Supervisor as under:-

Topic Plan of Thesis

To study clinical and neuro-electrophysiological parameters in patients with type 2 diabetes.

Supervisor

Dr. Rajinder K. Bansal
Prof.,
Dept. of Neurology,
DMCH, Ludhiana.

Co-Supervisor

Dr. Birinder Singh Paul
Prof.,
Dept. of Neurology,
DMCH, Ludhiana.

Dr. Parmider Singh
Prof. & Head,
Dept. of Endocrinology,
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The student has to submit the four copies of thesis (along with PDF format) , to the Controller of Examinations, BFUHS, Faridkot, at least six months before the commencement of theory examination, if he/she is otherwise eligible to take the examination. He /She must directed to attach a photocopy of this letter with the forwarding letter while submitting thesis to the University along with the letter of approval of University for change of supervisor/Co-Supervisor, change of topic,(if any).

Dr. S P Singh MS(Oph)
Controller of Examinations

Note :

171. If any discrepancy found regarding topic of thesis or Supervisor/Co-Supervisor, inform undersigned within one month after issue of this letter.

172. The student may submit the thesis as per the schedule already conveyed i.e for May/June examination 30th Nov of the preceding the year of examination and for Nov/Dec examinations 31st May of the year of examination.

TO STUDY CLINICAL AND NEURO-ELECTROPHYSIOLOGICAL PARAMETERS IN PATIENTS WITH TYPE 2 DIABETES

THESIS PROPOSAL

FOR APPROVAL OF SUBJECT OF THESIS TO BE SUBMITTED

IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

DOCTORATE OF MEDICINE

IN

NEUROLOGY

OF THE

BABA FARID UNIVERSITY OF HEALTH SCIENCES
FARIDKOT

AUGUST, 2021

DR. RAJAT GUPTA

DEPARTMENT OF NEUROLOGY
DAYANAND MEDICAL COLLEGE & HOSPITAL
LUDHIANA

ABSTRACT OF PLAN OF THESIS

Title	TO STUDY CLINICAL AND NEURO-ELECTROPHYSIOLOGICAL PARAMETERS IN PATIENTS WITH TYPE 2 DIABETES.
For the degree of	D.M Neurology
Name of the candidate	Dr. Rajat Gupta
Supervisor	Dr. Rajinder K. Bansal, Professor, Department of Neurology, DMCH
Co-supervisor	Dr. Birinder Singh Paul, Professor, Department of Neurology, DMCH Dr. Parminder Singh, Professor & Head, Department of Endocrinology, DMCH
Institution	Dayanand Medical College & Hospital, Ludhiana
University	Baba Farid University of Health Sciences, Faridkot

Introduction: Individuals with diabetes are at increased risk of developing diabetic peripheral neuropathy (DPN), a debilitating microvascular complication, encountered in more than one-third of diabetic patients.

Aim of Study: To study clinical and neuro-electrophysiological parameters in patients with Type 2 Diabetes.

Materials & Methods: An observational non blinded cross sectional study will be conducted in the Department of Neurology in DMC & H, Ludhiana. Patients of Type 2 Diabetes who meet the inclusion criteria will be enrolled in the study from neurology and endocrinology outpatient departments of DMC & H. Total duration of study will be One and half years and sample size will be 200. Detailed history and physical examination will be done in all patients and recent biochemical tests noted from patient's records. Clinical assessment of peripheral neuropathy will be done using Michigan Neuropathy Screening Instrument and neuro-electrophysiological assessment will be done by Nerve Conduction Study, Sympathetic Skin Response and Vibration perception threshold. Ankle-brachial index measurement and Fundus examination will also be done in all patients and Foot photographs will be taken.

Clinical Significance: Identification of newer parameters for early diagnosis of DPN will help in prevention of complication. Better understanding of pathophysiology of DPN may lead to effective targeted therapies.

(Signature)	(Signature)	(Signature)	(Signature)	(Signature)
Candidate	Co-supervisor	Co-supervisor	Supervisor	Principal

CERTIFICATE OF FACILITIES AVAILABLE

This is to certify that the facilities for work on the subject of thesis titled **"To study clinical and neuro-electrophysiological parameters in patients with Type 2 Diabetes."** exist in the Department of Neurology, DMC&H, Ludhiana and will be provided to the candidate. We will see that the data being included in the thesis is genuine and is collected by the candidate himself under our supervision and guidance.

Supervisor

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Co-Supervisor

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Head of the Department

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Place : LUDHIANA

Date : 29/8/21

APPROVAL PROFORMA
BY RESEARCH & ETHICAL COMMITTEE
DAYANAND MEDICAL COLLEGE & HOSPITAL, LUDHIANA

Name of candidate	Dr. Rajat Gupta
Department	Neurology
Topic of Thesis	To study clinical and neuro-electrophysiological parameters in patients with Type 2 Diabetes.
Likely date of appearing in PG examination	September, 2023
Date of enrollment	28 December 2020
Name of Head of Department	Dr. Gagandeep Singh
1) Supervisor **2) Co-Supervisor(s)**	Dr. Rajinder K. Bansal Dr. Birinder Singh Paul Dr. Parminder Singh
Signature of Members of Research Committee with Stamp	**Signature of Members of Ethics Committee with Stamp**
Dr. Harpreet Kaur (Professor & Head, Pathology)	Mr. R K Sharma (Legal Expert)
Dr. Jaspal Singh (Professor & Head, Surgery)	Dr. Ramit Mahajan (Associate Professor, Gastroenterology)
Dr. Dinesh Gupta (Professor & Head, Medicine)	Dr. Anu Sharma (Professor, Anatomy)
Dr. Sandeep Kaushal (Dean Academics & Professor & Head, Pharmacology)	Dr. Sandeep Kaushal (Dean Academics & Professor & Head, Pharmacology)
Dr. Gurpreet S Wander (Vice Principal)	Dr. Gurpreet S Wander (Vice Principal & Professor & Head, Cardiology)
	Dr. Gagandeep Singh (Secretary, Ethics Committee Professor & Head, Neurology)

Approved: Yes / No

Dr. Sandeep Puri
Chairperson
Research Committee
Chairperson
Research Committee

Approved: Yes / ~~No~~

Prof. Arvind Malhotra
Chairperson
Ethics Committee
Chairperson
Ethics Committee

BABA FARID UNIVERSITY OF HEALTH SCIENCES, FARIDKOT

PERFORMA FOR REGISTRATION OF SUBJECT FOR DISSERTATION

1	NAME OF THE CANDIDATE AND ADDRESS	DR. RAJAT GUPTA Room No. 9, PG Hostel, DMCH, Ludhiana, Punjab
2	NAME OF THE INSTITUTE	DAYANAND MEDICAL COLLEGE AND HOSPITAL LUDHIANA
3	COURSE OF STUDY AND SUBJECT	DM NEUROLOGY
4	DATE OF ADMISSION OF COURSE	28-12-2020
5	TITLE OF THE TOPIC	TO STUDY CLINICAL AND NEURO-ELECTROPHYSIOLOGICAL PARAMETERS IN PATIENTS WITH TYPE 2 DIABETES.

6.0 BRIEF RESUME OF THE INTENDED WORK

6.1 NEED FOR THE STUDY

Diabetes mellitus (DM) is a metabolic disorder characterized by abnormalities in carbohydrate metabolism. As estimated by the international diabetes federation, there are 382 million people living with diabetes globally.[1] Individuals with diabetes are at increased risk of developing diabetic peripheral neuropathy (DPN), a debilitating microvascular complication, encountered in more than one-third of diabetic patients.[2] DPN represents a complex and progressive condition with no connection between pathological severity and development of symptoms. It may manifest heterogeneously by affecting different nerves. Distal symmetric sensorimotor polyneuropathy is the most commonly diagnosed clinical type of DPN. It is the leading cause of diabetes-related hospital admissions and is responsible for 50–75% of non-traumatic amputations. Diabetic peripheral neuropathic pain (DPNP) affects around 26% of persons with diabetes and is present in approximately one-third of DSPN patients [3], impairing their ability to perform activities of daily living and affecting their mental quality of life [4].

Not all patients present typical features of neuropathy, i.e., paraesthesias and weakness in upper and lower limbs. Up to 75% of such neurologically asymptomatic patients may have nerve conduction abnormalities that are typical of neuropathy. The transition from subclinical to clinical neuropathy in patients with DM has not been described, and despite being a gold standard for the diagnosis of all neuropathies, the value of NCS in detecting and predicting subclinical diabetic neuropathy is also not well established.[5]

Nerve conduction studies (NCS) are considered to be the most sensitive, reliable, non-invasive, and objective means of investigating diabetic neuropathy.[6] Although NCS form the basis for the diagnosis of DSP, they are complex, time-consuming, and require referral to specialized testing centers. Use of simple components of NCS and the

analysis of normal and abnormal threshold values specific for patients with diabetes could improve its applicability.

The prevailing view of the pathophysiology is that axonal degeneration and progressive loss of nerve fibers are paramount [7]. These axonal changes are identified by reduced motor and sensory action potential amplitudes, with normal or slightly reduced conduction velocities secondary to loss of the largest and fastest conducting axons [8]. However, diverse pathophysiologies may be factors in DSP. For example, some studies have demonstrated slowing of nerve conduction velocity out of proportion to axonal loss in DSP demonstrating evidence of demyelination [9,10]. Given the potential for diabetic patients to have a spectrum of pathophysiologies from a classical axonopathy, to evidence of minor or mild demyelinating findings, to evidence of a primary demyelinating disease as seen in CIDP it is important to distinguish between them because differentiation may lead to effective targeted therapies.

6.2 REVIEW OF LITERATURE

In 2020 Yi-Ching Weng et al conducted a cross-sectional study aimed at determining the prevalence of distal symmetrical polyneuropathy (DSPN) and diabetic peripheral neuropathic pain (DPNP) in participants with type 2 diabetes mellitus (T2DM); finding the risk factors for DSPN and DPNP via biochemical tests; and correlating DSPN and DPNP with the results of electrophysiologic studies, quantitative sensory tests, and neurologic examination. In all, 30% of participants had DSPN and 11% had DPNP. DSPN correlated strongly with male gender and higher glycohaemoglobin levels; NCS abnormality correlated with higher glycohaemoglobin levels; DSPN severity correlated with NCS of each stimulating nerve. DPNP commonly occurred with clinical and electrophysiologic evidence of DSPN. Symptomatic diabetic polyneuropathy significantly correlated with longer disease duration, higher glycohaemoglobin levels, and abnormal vibration tests. The thermal threshold test combined with nerve conduction tests could detect most of the patients with DSPN, subclinical DSPN, and minimal DSPN. Poor diabetic control was independently associated with the development of DSPN. DPNP was associated with DSPN. The combination of thermal threshold tests with NCS can potentially provide the diagnosis of DSPN.[11]

In 2018 Shivani Agarwal et al conducted a study to determine various nerve conduction parameters in neurologically asymptomatic diabetic patients with an attempt to evaluate their value in the early detection of subclinical diabetic neuropathy and to find out if any correlation exists. A longer latency, smaller amplitude and slower conduction velocity were found in all the nerves. Persistence was found to be lower and F-wave minimum latency prolonged amongst the cases. Sensory and motor NCS were found to be inferior in those with higher HbA1c. Latency, amplitude, and Nerve conduction velocity (NCV) of sural nerve showed deterioration with the duration of diabetes. All parameters of median, ulnar and common peroneal nerves showed deterioration with the duration of diabetes with the exception of NCV in common peroneal nerve and persistence in median nerve. They

concluded that NCS parameters are valuable for identification and future prediction of diabetic peripheral neuropathy.[12]

Advanced glycation endproducts (AGE) accumulate over proteins as a consequence of diabetic hyperglycemia, and thus contribute to the pathogenesis of diabetic complications. In 2004 I. Mišur et al conducted a study to improve the understanding of the pathology of diabetic neuropathy, AGE accumulation was analyzed in sural and/or femoral nerves obtained under spinal anesthesia from 8 type 2 diabetic patients with both distal symmetrical polyneuropathy and proximal neuropathy. Pronounced AGE immunoreactivity was detected on axons and myelin sheaths in 90% of diabetic peripheral nerves but not in the control specimen. The intensity of axonal AGE immunopositivity significantly correlated with the severity of morphological alterations. AGE localization, demonstrated by immunohistochemical methods, was also present in the endoneurium, perineurium and microvessels. Morphometric analysis of the diabetic peripheral nerve showed perineurial thickening, narrowing of the microvessel lumina and significant reduction in the number of preserved axons. The sera of diabetic patients contained epitope(s) of AGE structure and soluble immune complexes containing AGE moiety. Humoral immune mechanisms, including the production of anti-AGE autoantibody, may potentially be involved in the development of structural abnormalities described in this report.[13]

In 2000 N. Kohara et al conducted multicentre trials to assess the reproducibility of nerve conduction studies in healthy subjects and patients with diabetic polyneuropathy. They found that of all the measurements, F-wave latency yielded the highest intraclass correlation coefficient with the smallest relative intertrial variation for both median and tibial nerves in both groups. They concluded that Median and tibial F-wave latency provide the most reproducible measures for a nerve conduction study, serving as one of the best measures in multicentre drug trials for diabetic polyneuropathies.[14]

In 2013 Alanna Weisman et al conducted a study to determine the performance of single and simple combinations of NCS parameters for

identification and future prediction of DSP. Threshold values for peroneal conduction velocity and sural amplitude potential best identified Prevalent Cases. Baseline tibial F-wave latency, peroneal conduction velocity and the sum of three lower limb nerve conduction velocities (sural, peroneal, and tibial) best predicted 4-year incidence. Individual NCS parameters or their simple combinations are valid measures for identification and future prediction of DSP. Further research into the predictive roles of tibial F-wave latencies, peroneal conduction velocity, and sum of conduction velocities as markers of incipient nerve injury is needed to risk-stratify individuals for clinical and research protocols.[15]

In 2006 Moghtaderi et al conducted a study to determine the diagnostic performance of the test characteristics and cut-off point of Michigan neuropathy screening instrument (MNSI) scoring for the diagnosis of diabetic peripheral neuropathy. The accuracy of MNSI scoring makes it a useful screening test for diabetic neuropathy in taking a decision regarding which patients should be referred to a neurologist for electrophysiological studies. High specificity, likelihood ratios over 5 and a moderate to good post-test probability give a high diagnostic impact for MNSI scoring. They suggested a cut-off point of 2 for the MNSI procedure. However, electrophysiological studies should be considered when the patient has signs and symptoms other than those rated by the MNSI, suggesting peripheral nerve involvement, and also because the MNSI is still just a screening test.[16]

In 2008 Kayihan Uluc et al conducted a study to evaluate the medial plantar and dorsal sural NCS in a group of diabetic patients with distal sensory neuropathy (DSN) and in healthy controls. They concluded that Bilateral NCS assessment of both of the medial plantar and dorsal sural nerves together increases the rate of diagnosis of diabetic distal sensory neuropathy compared to assessment of either of these nerves.[17]

In 2021 Raffaele Galiero et al conducted a study to assess the ability of whole plantar nerve (WPN) conduction in diabetic PN early diagnosis.

They concluded that WPN may represent an extremely useful diagnostic tool for diabetic PN early detection.[18]

In 2012 Jean-Louis Richard et al conducted a study to compare the frequency of increased vibration perception threshold (VPT) with abnormal 10-g Semmes-Weinstein monofilament (SWF) testing in a non-selected diabetic population, and to assess the agreement between these two screening methods. They found that agreement between the two screening methods was only moderate. Using VPT as a predictor for foot ulceration, the number of patients at risk is much higher than identified by SWF. This discrepancy might have potential effects on costs and prevention policies.[19]

In 2018 Anirudhan Arya Medakkel et al conducted a study to find the association between VPT values and clinical symptoms of DPN. They found that VPT score can be considered an indicator of DPN and be used to identify high-risk patients. The VPT values are graded as mild (15-20v), moderate (20-25v), and severe (>25v).[20]

In 2002 Nazhel B et al conducted a study to perform Sympathetic skin Response (SSR) in diabetic patients to see whether this test can be used as an electrophysiological method for the diagnosis and confirmation of diabetic autonomic neuropathy. They concluded that latency measurement is an objective measure of conduction in multineural pathways and can detect subclinical involvement of sympathetic nervous system in diabetics who do not manifest symptoms or signs referable to autonomic system dysfunction.[21]

In 2004 Kucera et al conducted a study on sympathetic skin response and reviewed it's method and clinical use. They presented a more complex and informative view on the anatomical and physiological substrates of SSR, its character, normal values and technique, focusing on problems in evaluation of the response and factors that have influence on it. Based on their experience normative latency and amplitude values of SSR in a group of 20 healthy individuals (x +/- SD), upper extremities: 1.48 +/- 0.80 sec., 444 +/- 167 microV, respectively; lower extremities: 2.06 +/- 0.93 sec., 203 +/- 87.4 microV, respectively) and recommendations for qualitative evaluation preference--the

presence or absence of the response--over quantitative evaluation of latency and amplitude of the response in practical clinical use of the method are presented.[22]

In 2010 L. Potier et al studied the Use and Utility of Ankle Brachial Index in Patients with Diabetes. They found that in diabetic patients, it has some specific caveats. Sensitivity of the standard threshold of 0.9 appears to be lower in diabetic patients with complications. Moreover, highly frequent arterial medial calcifications in diabetes increase ABI. It has been demonstrated that measurements >1.3 are well correlated with both an increased prevalence of PAD and CV risk. Therefore, ABI thresholds of less than 0.9 and more than 1.3 are highly suspicious for PAD and high CV risk in diabetic patients. However, when there is concomitant clinical peripheral neuropathy or high risk of arterial calcification, the efficiency of ABI seems to be limited. In this case, other methods should be applied, toe pressure, in particular. Thus, the ABI could be used in patients with diabetes, but values should be interpreted with precision, according to the clinical situation.[23]

In 2020 Chuangbiao Zhang et al conducted a study to explore the relationship of of ankle-brachial index, vibration perception threshold, and current perception threshold to glycemic variability in type 2 diabetes. They foud that the higher the blood glucose levels, the severer the degree of lower extremity arterial disease and diabetic peripheral neuropathy lesions; the higher the incidence of hypoglycemia, the severer the degree of diabetic peripheral neuropathy lesions; the greater the fluctuation of blood glucose, the severer the degree of lower extremity arterial disease lesions. However, the glycemic variability was not significantly correlated with DPN.[24]

6.3 AIMS AND OBJECTIVES OF THE STUDY

AIM

To study clinical and neuro-electrophysiological parameters in patients with Type 2 Diabetes.

OBJECTIVE

To study clinical and neuro-electrophysiological parameters in patients of Type 2 Diabetes and to study association between them.

7.0 MATERIALS AND METHODS

7.1 SOURCE OF DATA:

An observational non blinded cross sectional study will be conducted in the Department of Neurology in DMC & H, Ludhiana. Patient with diagnosis of Type 2 Diabetes will be enrolled in the study from neurology and endocrinology outpatient departments of DMC & H, Ludhiana. Total duration of study will be One and half years and sample size will be 200.

7.2 METHOD OF COLLECTION OF DATA

Inclusion Criteria- Patients >40 years of age, any gender with duration of diabetes >1 year will be included in the study.

American Diabetes Association (ADA) criteria[25] will be used for diagnosis of Diabetes Mellitus

Criteria for the diagnosis of diabetes

FPG ≥126 mg/dL (7.0 mmol/L). Fasting is defined as no caloric intake for at least 8 h.
OR
2-h PG ≥200 mg/dL (11.1 mmol/L) during OGTT. The test should be performed as described by WHO, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water.
OR
A1C ≥6.5% (48 mmol/mol). The test should be performed in a laboratory using a method that is NGSP certified and standardized to the DCCT assay.
OR
In a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose ≥200 mg/dL (11.1 mmol/L).

Cases satisfying any of the following criteria will be excluded from the study:

(1) history of macrovascular disease (cardiac, cerebral, or peripheral vascular diseases).
(2) Chronic liver or renal failure.
(3) Other causes of neuropathy like vitamin B12 deficiency, hypothyroidism, autoimmune disease, paraproteinaemia.
(4) history of exposure to chemotherapeutic agent or heavy metals.
(5) abuse of illicit drugs or alcoholism within 1 year.

Written informed consent will be taken from all the participants in the study, and protocol approved by the Institutional Ethics Committee will be followed.
Detailed history and physical examination will be done in all patients and recent biochemical tests will be noted from patient's records.
Fundus examination will be done in all patients by an ophthalmologist.
Clinical assessment of peripheral neuropathy will be done using Michigan Neuropathy Screening Instrument (MNSI). MNSI is designed to screen for the presence of diabetic neuropathy. The MNSI is designed to be used in an outpatient setting by primary care or other providers. The first part of the screening instrument, the history questionnaire, consists of 15 self-administered "yes or no" questions on foot sensation including pain, numbness and temperature sensitivity. A higher score indicates more neuropathic symptoms.
The second part of the MNSI is a brief physical assessment (completed by health professionals) involving

1) inspection of the feet for deformities, dry skin, hair or nail abnormalities, callous or infection
2) semi-quantitative assessment of vibration sensation at the dorsum of the great toe
3) grading of ankle reflexes and
4) monofilament testing.

Foot photographs will be taken in all patients.

Neuro-electrophysiological studies including Nerve conduction study (NCS), Sympathetic skin response (SSR) and Vibration Percerption Threshold (VPT) will be done in all patients .

Nerve conduction study (NCS) will be done using Nihon Kohden EMG/EP Measuring System, System model MEB-9400K. NCS will be performed by conventional supramaximal percutaneous stimulation of the limbs and surface recordings. Median and Ulnar nerve will be studied in the upper limb and Medial and Lateral Planter, Sural, Peroneal, Tibial, Femoral and Saphenous nerve will be studied in the lower limb. Nerve conduction velocity, amplitude, distal latency and F-wave latency and persistence will be recorded.

Sympathetic skin response (SSR) will be studied in both upper limb and lower limb. SSR represents a potential generated in skin sweat glands; it originates by activation of the reflex arch with different kinds of stimuli. SSR is most frequently used in diagnosing the functional impairment of non-myelinated postganglionic sudomotor sympathetic fibers in peripheral neuropathies.

The Vibration Percerption Threshold (VPT) and Ankle brachial index (ABI) will be measured by Biothesiometer Cum Vascular Doppler- VIBRODOP.

For measuring VPT a metal probe will be placed under the toes of the patient and the voltage will be increased gradually from zero and the transition from no vibration to the point of vibration is marked as VPT. Average of three measurements will be taken to calculate the VPT value of the given patient. In VPT, the electric current mode is converted into vibration mode. VPT measures large nerve fiber integrity and perception is normally poorer in lower extremity than the upper extremity.

Ankle brachial index (ABI) is a simple method to screen peripheral arterial disease (PAD) and to evaluate cardiovascular (CV) prognosis in the general population. The ankle-brachial index (ABI) is the ratio of the systolic blood pressure (SBP) measured at the ankle to that

measured at the brachial artery. ABI will be measured using a hand-held Doppler probe. ABI is an effective tool for clinical practice or clinical studies.

DURATION OF STUDY: Total duration of study will be One and half years.

OUTCOME: Identification of newer parameters for early diagnosis and better understanding of pathophysiology of diabetic peripheral neuropathy.

STATISTICAL ANALYSIS:

The distribution of MNSI total score and Diabetic peripheral neuropathy rate will be summarized as mean ± standard deviation(SD). Results will be analysed using the two-sample *t*-test and Pearson chi-square test. Demographics, clinical characteristics, electrophysiologic studies, and neurologic examination will be presented as mean ± SD for continuous data and *n* (%) for categorical data by group. Differences between two groups will be conducted using the two sample *t*-test for continuous data and Pearson chi-squared test for categorical ones. Furthermore, the differences in demographics and clinical characteristics will also be compared using the one-way ANOVA test for continuous variables and the chi square test for categorical ones. All statistical assessments will be two-tailed and considered significant at $p < 0.05$. Statistical analyses will be performed and derived from Microsoft Office Excel and SPSS version 2.0.

7.3 DOES THE STUDY REQUIRE ANY INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENTS OR OTHER HUMANS OR ANIMALS? IF SO, PLEASE DESCRIBE BRIEFLY.

NO

7.4 HAS ETHICAL CLEARENCE BEEN OBTAINED FROM YOUR INSTITUTION

ATTACHED HERE WITH

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PERFORMA

Name: Serial No.

MRD No.

Age:

Sex:

Address:

Education:

Occupation:

Religion:

Chief complaints

Brief History of Present illness

Past History

Personal History

Family History

Socioeconomic History

Treatment History

Signature of Candidate

Signature of Supervisor

Examination

General Physical Examination

Systemic Examination

Fundus examination

Foot photograph

Investigation

Blood Sugar Fasting-

HbA1c-

UACR-

Signature of Candidate

Signature of Supervisor

MICHIGAN NEUROPATHY SCREENING INSTRUMENT

QUESTIONNAIRE

Please take a few minutes to answer the following questions about the feeling in your legs and feet. Check yes or no based on how you usually feel. Thank you.

1.	Are your legs and/or feet numb?	☐ Yes	☐ No
2.	Do you ever have any burning pain in your legs and/or feet?	☐ Yes	☐ No
3.	Are your feet too sensitive to touch?	☐ Yes	☐ No
4.	Do you get muscle cramps in your legs and/or feet?	☐ Yes	☐ No
5.	Do you ever have any prickling feelings in your legs or feet?	☐ Yes	☐ No
6.	Does it hurt when the bed covers touch your skin?	☐ Yes	☐ No
7.	When you get into the tub or shower, are you able to tell the hot water from the cold water?	☐ Yes	☐ No
8.	Have you ever had an open sore on your foot?	☐ Yes	☐ No
9.	Has your doctor ever told you that you have diabetic neuropathy?	☐ Yes	☐ No
10.	Do you feel weak all over most of the time?	☐ Yes	☐ No
11.	Are your symptoms worse at night?	☐ Yes	☐ No
12.	Do your legs hurt when you walk?	☐ Yes	☐ No
13.	Are you able to sense your feet when you walk?	☐ Yes	☐ No
14.	Is the skin on your feet so dry that it cracks open?	☐ Yes	☐ No
15.	Have you ever had an amputation?	☐ Yes	☐ No

Total.....

Signature of Candidate

Signature of Supervisor

मिशीगन न्यूरोपैथी सक्रीनिंग इन्सट्रुमैंट

प्रश्न पत्र

अपनी टांगों और/या पाँवों में होने वाली अनुभुति के बारे में बताने के लिए कृपया कुछ समय दें। हाँ या ना का परिक्षण आप आमतौर पर अपनी अनुभुति के आधार पर कीजिए । धन्यवाद।

1.	क्या आपकी टांगें और/या पाँव सुन्न हैं ?	☐ हाँ	☐ नहीं
2.	क्या आपकी टांगों और/या पाँवों में कभी भी जलने वाला दर्द होता है?	☐ हाँ	☐ नहीं
3.	क्या आपके पाँव छूने पर अत्यधिक संवेदनशील है?	☐ हाँ	☐ नहीं
4.	क्या आपकी टांगों और/या पाँवों की मांसपेशियों मे ऐंठन होती है?	☐ हाँ	☐ नहीं
5.	क्या कभी भी आपकी टांगों और/या पाँवों में चुभन महसूस होती है?	☐ हाँ	☐ नहीं
6.	क्या जब आपकी त्वचा को बिस्तर के कवर छूते हैं, तो दर्द होता है?	☐ हाँ	☐ नहीं
7.	क्या जब आप टब या शावर में नहाने जाते हैं तो क्या आप ठंडे पानी से गर्म पानी का अंतर बता पाते हैं?	☐ हाँ	☐ नहीं
8.	क्या कभी भी आपके पाँवों में खुला घाव हुआ था?	☐ हाँ	☐ नहीं
9.	क्या आपके डाकटर ने कभी बताया है कि आपको डायबिटिक न्यूरोपैथी है?	☐ हाँ	☐ नहीं
10.	क्या आप अधिकतर समय पूरे पूरे शरीर में कमजोरी महसूस करते हैं?	☐ हाँ	☐ नहीं
11.	क्या आपके लक्षण रात में अधिक बदतर हो जाते हैं?	☐ हाँ	☐ नहीं
12.	क्या आपकी टांगों में चलते समय दर्द होता है?	☐ हाँ	☐ नहीं
13.	क्या चलते समय आप अपने पाँवों को महसूस कर पाते है?	☐ हाँ	☐ नहीं
14.	क्या आपके पैरों की त्वचा इतनी सूखी है कि वो फट जाती है?	☐ हाँ	☐ नहीं
15.	क्या आपका कभी भी कोई अंग काटा गया है?	☐ हाँ	☐ नहीं

योग: .....

ਮਿਸ਼ੀਗਨ ਨਿਯੂਰੋਪੈਥੀ ਸਕਰੀਨਿੰਗ ਇੰਸਟਰੂਮੈਂਟ

ਪ੍ਰਸ਼ਨਾਵਲੀ

ਤੁਹਾਡੀਆਂ ਲੱਤਾਂ ਅਤੇ ਪੈਰ ਕਿਵੇਂ ਮਹਿਸੂਸ ਕਰ ਰਹੇ ਹਨ, ਇਸ ਬਾਰੇ ਹੇਠਾਂ ਦਿੱਤੇ ਸਵਾਲਾਂ ਦੇ ਜਵਾਬ ਦੇਣ ਲਈ ਕਿਰਪਾ ਕੁਝ ਮਿੰਟ ਕੱਢੋ। ਤੁਸੀਂ ਆਮ ਕਿਵੇਂ ਮਹਿਸੂਸ ਕਰਦੇ ਹੋ ਉਸਦੇ ਆਧਾਰ ਤੇ ਹਾਂ ਜਾਂ ਨਾਂਹ ਚੈੱਕ ਕਰੋ। ਤੁਹਾਡਾ ਧੰਨਵਾਦ।

1.	ਕੀ ਤੁਹਾਡੀਆਂ ਲੱਤਾਂ ਅਤੇ/ਜਾਂ ਪੈਰ ਸੁੰਨ ਹਨ?	☐ ਹਾਂ	☐ ਨਹੀਂ
2.	ਕੀ ਤੁਸੀਂ ਕਦੇ ਆਪਣੀਆਂ ਲੱਤਾਂ ਅਤੇ/ਜਾਂ ਪੈਰਾਂ ਵਿੱਚ ਜਲਣ ਮਹਿਸੂਸ ਕਰਦੇ ਹੋ?	☐ ਹਾਂ	☐ ਨਹੀਂ
3.	ਕੀ ਤੁਹਾਡੇ ਪੈਰ ਛੂਹਣ ਪ੍ਰਤੀ ਬਹੁਤ ਸੰਵੇਦਨਸ਼ੀਲ ਹਨ?	☐ ਹਾਂ	☐ ਨਹੀਂ
4.	ਕੀ ਤੁਹਾਡੀਆਂ ਲੱਤਾਂ ਅਤੇ/ਜਾਂ ਪੈਰਾਂ ਵਿੱਚ ਮਾਸਪੇਸ਼ੀਆਂ ਦਾ ਕੜੱਲ ਪੈਂਦਾ ਹੈ?	☐ ਹਾਂ	☐ ਨਹੀਂ
5.	ਕੀ ਤੁਸੀਂ ਕਦੇ ਆਪਣੀਆਂ ਲੱਤਾਂ ਅਤੇ/ਜਾਂ ਪੈਰਾਂ ਵਿੱਚ ਚੁੱਭਣ ਵਾਂਗ ਮਹਿਸੂਸ ਕਰਦੇ ਹੋ?	☐ ਹਾਂ	☐ ਨਹੀਂ
6.	ਕੀ ਜਦੋਂ ਤੁਹਾਡੀ ਚਮੜੀ ਨੂੰ ਬੈੱਡ ਦੀ ਚਾਦਰ ਛੂੰਹਦੀ ਹੈ, ਤਾਂ ਕੀ ਤੁਹਾਨੂੰ ਦਰਦ ਹੁੰਦਾ ਹੈ?	☐ ਹਾਂ	☐ ਨਹੀਂ
7.	ਜਦੋਂ ਤੁਸੀਂ ਟੱਬ ਜਾਂ ਸ਼ਾਵਰ ਹੇਠ ਨਹਾਉਂਦੇ ਹੋ ਤਾਂ ਤੁਹਾਨੂੰ ਠੰਡੇ ਜਾਂ ਗਰਮ ਪਾਣੀ ਦਾ ਫਰਕ ਪਤਾ ਲੱਗਦਾ ਹੈ?	☐ ਹਾਂ	☐ ਨਹੀਂ
8.	ਕੀ ਕਦੇ ਤੁਹਾਡੇ ਪੈਰ ਤੇ ਖੁੱਲਾ ਜਖਮ ਹੋਇਆ ਹੈ?	☐ ਹਾਂ	☐ ਨਹੀਂ
9.	ਕੀ ਤੁਹਾਡੇ ਡਾਕਟਰ ਨੇ ਕਦੇ ਤੁਹਾਨੂੰ ਕਿਹਾ ਕਿ ਤੁਹਾਨੂੰ ਡਾਇਆਬੈਟਿਕ ਨਿਊਰੋਪੈਥੀ ਹੈ?	☐ ਹਾਂ	☐ ਨਹੀਂ
10.	ਕੀ ਤੁਸੀਂ ਜ਼ਿਆਦਾਤਰ ਸਮਾਂ ਕਮਜ਼ੋਰੀ ਮਹਿਸੂਸ ਕਰਦੇ ਹੋ?	☐ ਹਾਂ	☐ ਨਹੀਂ
11.	ਕੀ ਲੱਛਣ ਰਾਤ ਸਮੇਂ ਵੱਧ ਜਾਂਦੇ ਹਨ?	☐ ਹਾਂ	☐ ਨਹੀਂ
12.	ਕੀ ਜਦੋਂ ਤੁਸੀਂ ਚੱਲਦੇ ਹੋ ਤਾਂ ਤੁਹਾਡੀਆਂ ਲੱਤਾਂ ਦੁਖਦੀਆਂ ਹਨ?	☐ ਹਾਂ	☐ ਨਹੀਂ
13.	ਕੀ ਜਦੋਂ ਤੁਸੀਂ ਚੱਲਦੇ ਹੋ ਤਾਂ ਕੀ ਤੁਸੀਂ ਆਪਣੇ ਪੈਰਾਂ ਨੂੰ ਮਹਿਸੂਸ ਕਰਨ ਦੇ ਯੋਗ ਹੁੰਦੇ ਹੋ?	☐ ਹਾਂ	☐ ਨਹੀਂ
14.	ਕੀ ਤੁਹਾਡੇ ਪੈਰ ਦੀ ਚਮੜੀ ਇੰਨੀ ਸੁੱਕੀ ਹੈ ਕਿ ਇਹ ਫੱਟ ਜਾਂਦੀ ਹੈ?	☐ ਹਾਂ	☐ ਨਹੀਂ
15.	ਕੀ ਤੁਹਾਡਾ ਕਦੇ ਅੰਗ ਕੱਟਿਆ ਗਿਆ ਹੈ?	☐ ਹਾਂ	☐ ਨਹੀਂ

ਕੁੱਲ: .....

MICHIGAN NEUROPATHY SCREENING INSTRUMENT

B. Physical Assessment (To be completed by health professional)

1. Appearance of Feet

	Right	Left
a. Normal	☐ Yes ☐ No	Normal ☐ Yes ☐ No
b. If no, check all that apply.		If no, check all that apply.
Deformities	☐	Deformities ☐
Dry skin, callus	☐	Dry skin, callus ☐
Infection	☐	Infection ☐
Fissure	☐	Fissure ☐
Other	☐	Other ☐
Specify: _____		Specify: _____

	Right			Left		
	Absent	Present		Absent	Present	
2. Ulceration	☐ 0	☐ 1		☐ 0	☐ 1	
3. Ankle Reflexes	Present	Present/ Reinforcement	Absent	Present	Present/ Reinforcement	Absent
	☐ 0	☐ 0.5	☐ 1	☐ 0	☐ 0.5	☐ 1
4. Vibration Perception at Great toe	Present	Present/ Decreased	Absent	Present	Present/ Decreased	Absent
	☐ 0	☐ 0.5	☐ 1	☐ 0	☐ 0.5	☐ 1
5. Monofilament	Normal	Reduced	Absent	Normal	Reduced	Absent
	☐ 0	☐ 0.5	☐ 1	☐ 0	☐ 0.5	☐ 1

Signature: _____ Total Score: _____/10 points

Motor Nerve Conduction Study

Site		**Onset Latency**	**N.D. (ms) ≤ 95th percentile**	**CMAP**	**N.D. (mV) ≥ 5th percentile**	**NCV**	**N.D. (m/s) ≥ 5th percentile**
Median	Left						
Distal			**≤ 4.3 ms**		**≥ 5 mV**		**≥ 45 m/s**
Proximal							
Median	Right						
Distal			**≤ 4.3 ms**		**≥ 5 mV**		**≥ 45 m/s**
Proximal							
Ulnar	Left						
Distal			**≤ 3.5 ms**		**≥ 5.5 mV**		**≥ 43 m/s**
Proximal							
Ulnar	Right						
Distal			**≤ 3.5 ms**		**≥ 5.5 mV**		**≥ 43 m/s**
Proximal							
Peroneal	Left						
Distal			**≤ 5.4 ms**		**≥ 2mV**		**≥ 37 m/s**
Proximal							
Peroneal	Right						
Distal			**≤ 5.4 ms**		**≥ 2mV**		**≥ 37 m/s**
Proximal							
Tibial	Left						
Distal			**≤ 6.1 ms**		**≥ 3.5 mV**		**≥ 35 m/s**

Signature of Candidate Signature of Supervisor

Proximal							
Tibial	Right						
Distal			**≤ 6.1 ms**		**≥ 3.5 mV**		**≥ 35 m/s**
Proximal							
Femoral	Left		**≤ 7.5 ms**		**≥ 2 mV**		**≥ 40 m/s**
	Right						
Medial Planter motor	Left		**≤ 3.7 ms**		**≥ 5.5 mV**		**≥ 45 m/s**
	Right						
Lateral Planter motor	Left		**≤ 3.7 ms**		**≥ 5.5 mV**		**≥ 45 m/s**
	Right						

Signature of Candidate

Signature of Supervisor

Sensory Nerve Conduction Study

Site		**Onset Latency**	**N.D. (ms) ≤ 95th percentile**	**SNAP**	**N.D. (µV) ≥ 5th percentile**	**NCV**	**N.D. (m/s) ≥ 5th percentile**
Median	Left		**≤ 3.1 ms**		**≥ 11 µV**		**≥ 50 m/s**
	Right						
Ulnar	Left		**≤ 3 ms**		**≥ 11 µV**		**≥ 50 m/s**
	Right						
Sural	Left		**≤ 4.4 ms**		**≥ 9 µV**		**≥ 40 m/s**
	Right						
Superficial Peroneal	Left		**≤ 4.4 ms**		**≥ 6 µV**		**≥ 40 m/s**
	Right						
Saphenous	Left		**≤ 4.4 ms**		**≥ 4 µV**		**≥ 40 m/s**
	Right						
Medial Planter sensory	Left		**Variable**		**≥ 2 µV**		**≥ 35 m/s**
	Right						
Lateral Planter sensory	Left		**Variable**		**≥ 1µV**		**≥ 35 m/s**
	Right						

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F wave

Nerve		**F-wave onset latency**	**N.D. (ms) ≤ 95th percentile**	**F-wave persistence**	**N.D. (%)**
Median	Left		**≤ 31.2 ms**		**≥ 50 %**
	Right				
Ulnar	Left		**≤ 32.1 ms**		**≥ 50 %**
	Right				
Peroneal	Left		**≤ 59.3 ms**		**≥ 25 %**
	Right				
Tibial	Left		**≤ 54 ms**		**≥ 80 %**
	Right				

Sympathetic skin response-

		Latency	**N.D. (ms) ≤ 95th percentile**
Upper Limb	Left		**≤ 1700 ms**
	Right		
Lower Limb	Left		**≤ 2200 ms**
	Right		

Vibration perception threshold-

Ankle brachial index-

Signature of Candidate Signature of Supervisor

INFORMED PATIENT CONSENT

Date: _____

I.....D/o, W/o, S/o.....

Resident of..... I am willing to participate in the study "To study clinical and neuro-electrophysiological parameters in patients with Type 2 Diabetes." The procedure with its complications has been explained to me in local vernacular language. I have fully understood that no special tests and extra expenditure in any form, merely for the purpose of thesis is being carried out. I am free to opt out the study any time without assigning any reason.

.....
Signature of the Witness

Name:

.....
Signature of the patient

Signature of Candidate

Signature of Supervisor

मरीज अनुमति फार्म

तिथि _____

मैं _____ पत्नी/पुत्र/पुत्री _____

निवासी _____

इस शोधकार्य **"To study clinical and neuro-electrophysiological parameters in patients with Type 2 Diabetes."** में भाग लेने के लिए सहमत हूँ। मैं इस शोधकार्य में भाग लेने के लिए अपनी स्वेच्छा से तैयार हूँ। मैं पुष्टि करता/करती हूँ की यह स्वीकृति देने के लिए मुझे कोई आर्थिक प्रलोभन नहीं दिया गया और न ही दबाव डाला गया है। मुझे इस शोधकार्य का उद्देश्य स्पष्ट कर दिया गया है और मुझे यह विश्वास है की यह विज्ञान और मानवता के लाभ के लिए है। मुझे इस शोधकार्य में होने वाले जोखिम के बारे में समझा दिया गया है और मेरी समझ में यह जोखिम बहुत मामुली है।

मैं इस शोधकार्य में भाग लेने के सम्बन्ध में किसी भी समय अपनी अस्वीकृति व्यक्त कर सकता/सकती हूँ और मेरे अस्वीकृति व्यक्त करने का मेरे इलाज पर कोई प्रभाव नहीं पड़ेगा।

_____

गवाह के हस्ताक्षर

नाम:

_____

रोगी के हस्ताक्षर/अंगूठे का निशान

नाम:

_____

अन्वेषक के हस्ताक्षर

_____

विद्यार्थी के हस्ताक्षर

ਮਰੀਜ਼ ਰਜ਼ਾਮੰਦੀ ਫਾਰਮ

ਮਿਤੀ_____

ਮੈ_____ਪਤਨੀ/ਪੁੱਤਰ/ਪੁੱਤਰੀ_____

ਵਾਸੀ _____

"To study clinical and neuro-electrophysiological paramotors in patients with Type 2 Diabetes." ਤੇ ਚਲ ਰਹੀ ਖੋਜ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਰਜ਼ਾਮੰਦ ਹਾਂ। ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਮੈ ਆਪਣੀ ਮਰਜ਼ੀ ਨਾਲ ਤਿਆਰ ਹਾਂ। ਮੈ ਇਹ ਦਸਣਾ ਚਾਹੁੰਦਾ ਹਾਂ/ ਚਾਹੁੰਦੀ ਹਾਂ ਕੇ ਇਹ ਰਜ਼ਾਮੰਦੀ ਦੇਣ ਵਾਸਤੇ ਮੈਨੂ ਕਿਸੇ ਵੀ ਤਰਾਂ ਦਾ ਲੋਭ-ਲਾਲਚ ਨਹੀ ਦਿੱਤਾ ਗਿਆ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਦਬਾ ਪਾਇਆ ਗਿਆ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਦਾ ਮਨੋਰਥ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਭਰੋਸਾ ਦਵਾਇਆ ਗਿਆ ਹੈ ਕੇ ਇਹ ਖੋਜ ਵਿਗਿਆਨ ਅਤੇ ਮਾਨਵਤਾ ਦੀ ਭਲਾਈ ਲਈ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਵਿਚ ਹੋਣ ਵਾਲੇ ਖਤਰੇ ਬਾਰੇ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਯਕੀਨ ਹੈ ਕੇ ਇਹ ਖਤਰਾ ਬਹੁਤ ਮਾਮੂਲੀ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਦਾ ਢੰਗ – ਤਰੀਕਾ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ।

ਮੈ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਬਾਰੇ ਆਪਣੀ ਰਜ਼ਾਮੰਦੀ ਕਿਸੇ ਵੀ ਸਮੇ ਵਾਪਸ ਲੈ ਸਕਦਾ ਹਾਂ/ ਸਕਦੀ ਹਾਂ ਅਤੇ ਮੇਰੀ ਰਜ਼ਾਮੰਦੀ ਵਾਪਸ ਲੈਣ ਦਾ ਮੇਰੇ ਇਲਾਜ ਤੇ ਕੋਈ ਅਸਰ ਨਹੀ ਹੋਵੇਗਾ।

_____ _____

ਗਵਾਹ ਦੇ ਹਸਤਾਖਰ ਮਰੀਜ਼ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____ ਮਿਤੀ_____

ਪਤਾ _____ ਪਤਾ _____

_____

ਨਿਰੀਖਕ ਦੇ ਹਸਤਾਖਰ

_____

ਸਿਖਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ